Geel 2000 Language Schools

Science Department

Primary (4)

First term

(2025-2026)

Name:………………………………………..

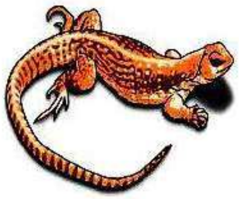
Class:…………………………………………

I love Science

Lesson ①

Concept (1)
Adaptation for survival

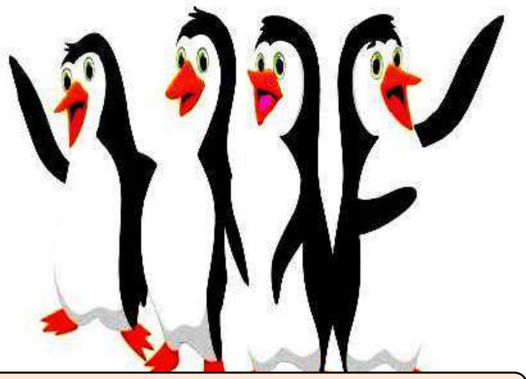
How living organisms protect itself from extreme heat of the sun?

Camel		its body is covered with thick hairy skin **to protect it from hot weather of desert.**
Desert lizard:		By finding shaded area.
Palm leaves: **Palm trees**		Covered with waxy layer. **Palm trees have strong roots to fix them in the soil against strong winds in desert.**
Human being:		By using umbrella and light clothes.

These different ways for protection known as: Adaptation

Adaptation:

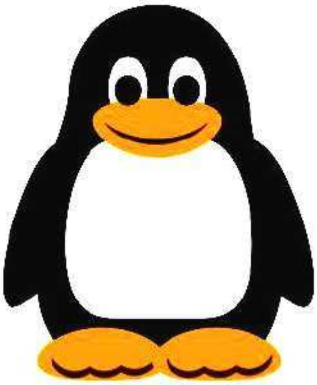
They are characteristics that help living organisms to survive and reproduce in the ecosystem in which they live.



Ecosystem: **is an area in which living and non living things interact with each other.**

G.R ***living organisms make adaptation.*** *To survive and reproduce.*

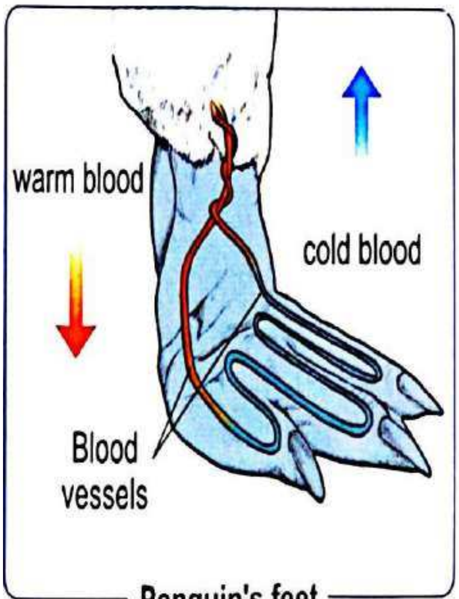
Adaptation of penguins to survive in cold environment:



Penguins live in **Antarctica**

Polar climate (coldest place on earth).

Habitat: **is the environment where living organisms live in.**

Penguin has fat layer and thick feather on his body	To keep its body warm in the freezing cold.
Penguin toes feet have no fat, no feather  Penguin's feet	**How penguin keeps its toes feet from freezing:** The warm blood vessels from body weave around the cold blood vessels from feet to heat up. **Note:** **warm blood** from body move **down** **cold blood** from feet **move up**.

Camouflage is one example of adaptation to survive.

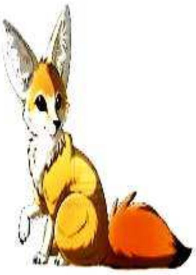
Camouflage:

It is an example of adaptation in which some animals hide from predators or preys by blending with surrounding environment.

Predator is an animal that eats another animal.

Prey is an animal that is eaten.

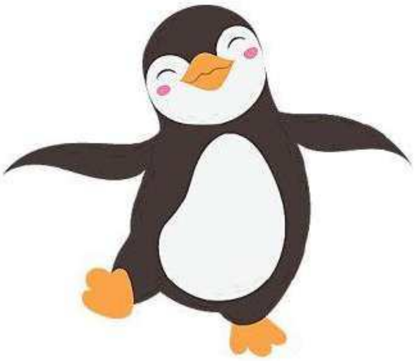
Examples of animals make camouflage:

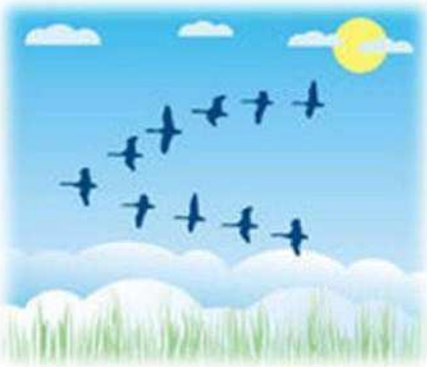
		Habitat	Way of adaptation
1- Polar bear:		Arctic region (Polar region)	**It has thick white fur** To keep it warm and to blend with snow to sneak up on its prey.
2- Brown bear and dark bear: (black bear)		Forests	**It has dark fur** To stay hidden among trees during hunting.
3-Caracal and fennec fox:		Desert	**It has sandy (tan) fur** To hide and blend with desert environment.
4-Lizards:		Desert between colorful rocks	**They have colorful scales** To make them hard to see between rocks.

Lesson ② Types of adaptation

Types of adaptation

	1- Structural adaptation (physical) تكيف تركيبي	2- Behavioral adaptation تكيف سلوكي
Definition	A change happens in the **body** of animals.	A change happens in the **behavior** of animals.
Examples	The blood vessels in penguin feet The thick fur of the polar bear	Desert lizard looks for shade in hot sun Migration of some animals.





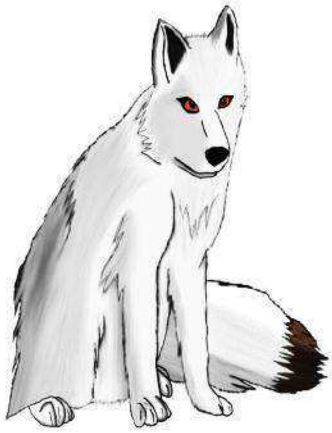
① - Fennec fox

Live in desert

Structural adaptation:	**It has brown sandy fur** **(tan colored fur)** To hide and protect from the hot sun **(it hides in sandy and rocky environment (camouflage)** **It has extra-large ears** a- To lose heat to cool its body. b- To allow good hearing for hunts.
Behavior adaptation:	**It pants like dogs** To cool its body. **(it takes up 700 breaths per minute).** **It lives in burrows** To stay cool in sunny days. **It eats different kinds of food** **(insects ,fruits , plant roots & prey remains.** Because It is hard to find food in desert.

② - Arctic fox

Live in Tundra (cold) desert



Structural adaptation:	**It has thick fur coat** To help it stays warm. **It has white fur in winter – brown in summer** To hide from preys in any season. **It has short ears and legs** a- To help it stays warm. b- To strength the sense of hearing for hunting.
Behavior adaptation:	**It eats different kinds of food (insects ,fruits , plant roots & prey remain)** Because It is hard to find food in desert. **It lives in burrows to stay warm at night.**

The special shape of ears in both fennec and arctic foxes allow excellent hearing to help them hunt.

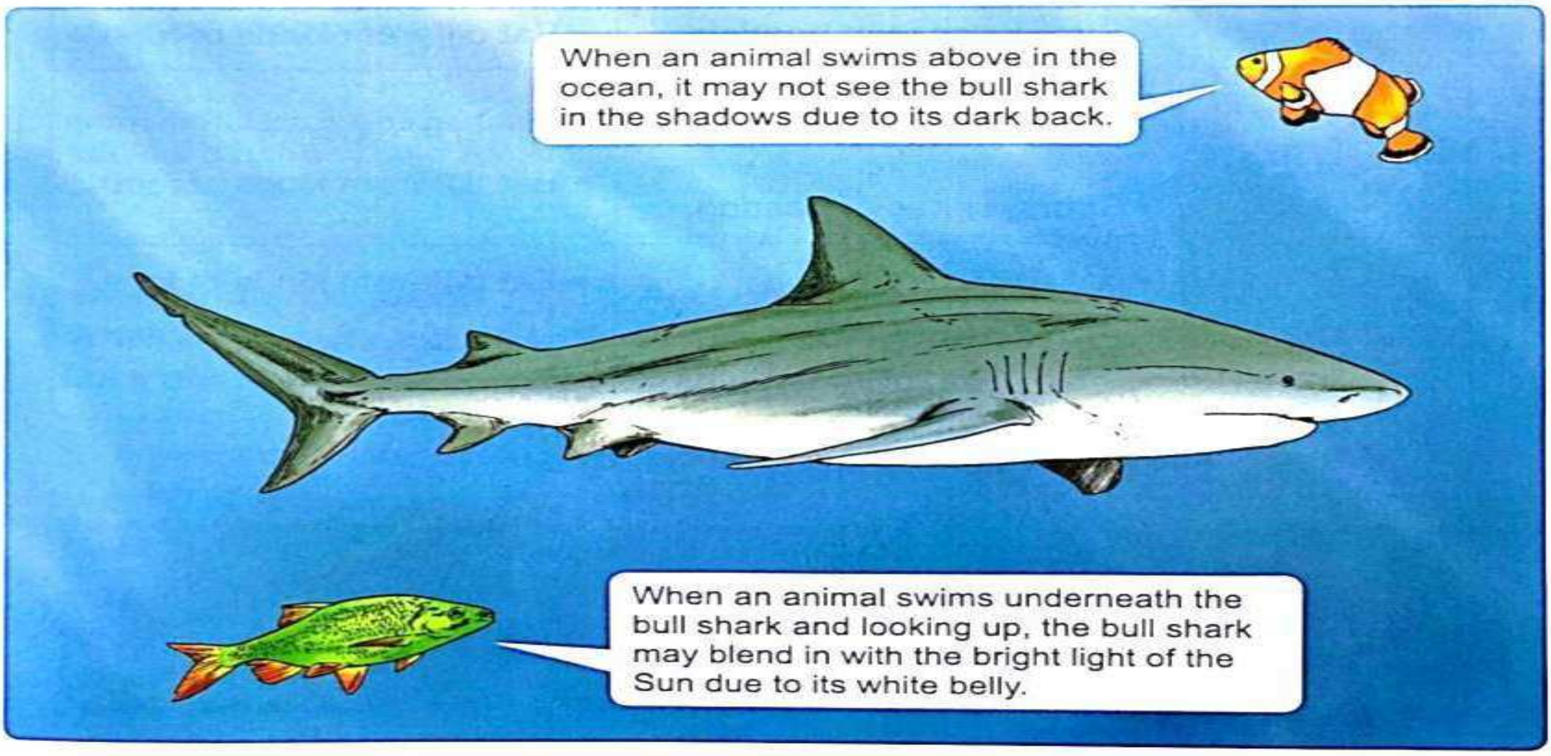
③ - Bull shark

lives in fresh and salty water

Structural adaptation:	It has dark back and white belly (it uses countershading camouflage strategy) To hunt and get food (preys) It has sharp teeth To cut prey's flesh. *Only bull sharks live in fresh water So it has less competition to find food.
Behavior adaptation:	It can hunt in salty and fresh water and It feeds on different types of food It hunts in the day and the night so, Its prey can't predict hunt time (it can surprise its prey)

Most sharks can live only in salt water but in bull sharks, their bodies have adapted to live in both fresh and salt water.

Countershading in bull shark :



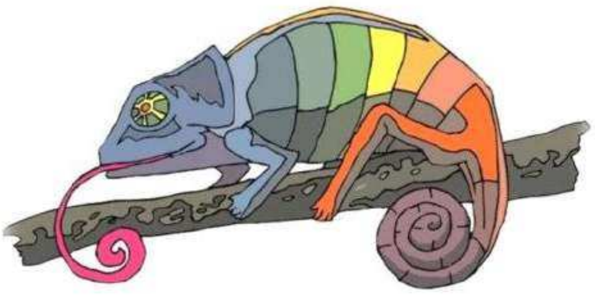
When an animal swims above in the ocean, it may not see the bull shark in the shadows due to its dark back.

When an animal swims underneath the bull shark and looking up, the bull shark may blend in with the bright light of the Sun due to its white belly.

④ - Panther chameleon

It lives in tropical rainforest

Structural adaptation:	**It has bright colored scales** To camouflage with surrounding environment and hide between green leaves and colourful flowers. **Its eyes move in opposite directions** One eye search food and the other eye to avoid danger. **It has very long sticky tongue** To hunt insects for feeding. **It has V-shaped feet and tail like a hand** To hold tightly the branches of tree
Behavior adaptation:	**In danger it scare its attacker by** - It puffs up its body with air. - It opens its mouth wide. - It changes scales color.



***Lizards** are from reptiles.

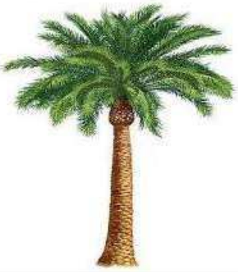
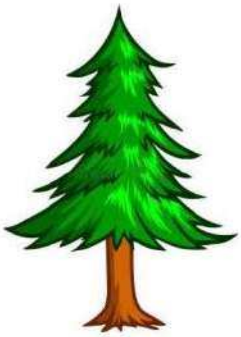
* They are an ancient type of animals found all over the world environment.

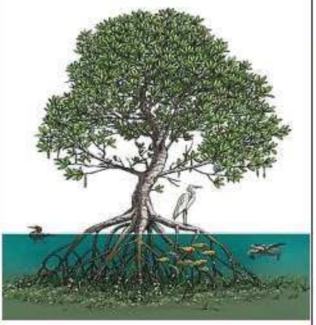
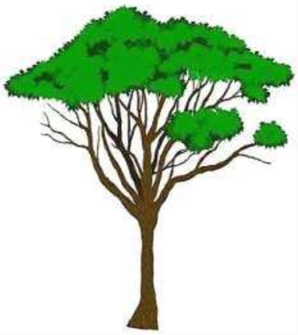
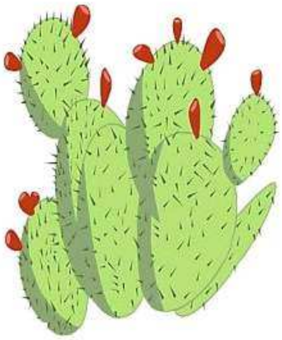
* Bodies of reptiles are covered with scales as starred agama lizard and panther chameleon.

Lesson ③ Plant adaptation

- Plants can grow in every place and it has structural and behavior adaptation like animals that help them to survive.

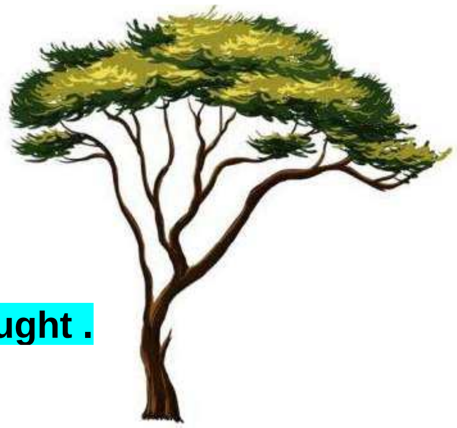
Examples of plants Structural adaptation:

Plant	Habitat	Structural adaptation	Reason
① **Water lily** 	**Wetland** **Fresh water**	It has wide leaves float on water.	To absorb sunlight.
② **Palm tree** 	**Desert**	It has thick roots & small leaves.	To resist strong winds
③ **Pine tree** 	**Snow**	It has a triangular shape and short branches.	To allow snow to slide easily over it without breaking its branches.
		It has needle leaves.	To prevent the of water.

Plant	Habitat	Structural adaptation	Reason
④ **Mangrove tree** 	Salt water	It has long and strong roots.	To resist waves of water.
⑤ **Acacia tree** 	Savannah forests	Its branches grow up.	To prevent animals from eating.
⑥ **Barbary fig** 	Desert	It has sharp spines.	To prevent animals from eating its leaves.

Adaptation of two terrific trees to survive in their environment:

1- Acacia tree -

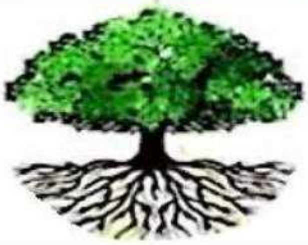


Habitat: It grows in Savannah forest in Africa

*** It is a grassland habitat with a mild temperature.**

*** Most large plants cannot grow in this habitat, due drought .**

Structural adaptation:

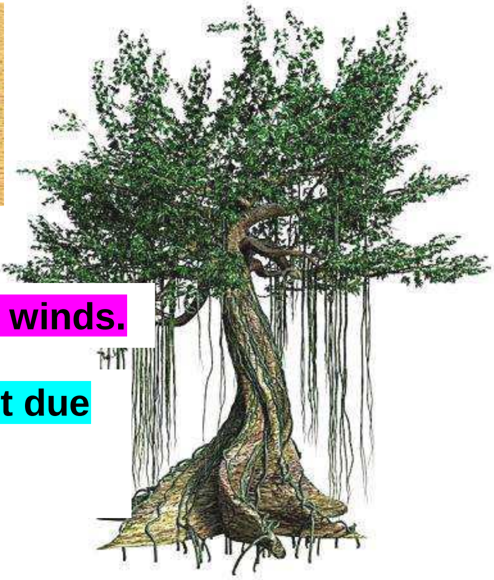
① Roots	It has very long roots grows directly downward known as "taproot" To search for water in deep soil. 
② Trunk	It stores water in its trunk as camel that stores fat in its hump. Its trunk is very long and giraffe only can reach its leaves. .
③ Leaves	It has tiny leaves on its top to hold them in water, While soaking up to absorb sunlight to make food. It has sharp spines around the leaves, to prevent animals from eating these leaves.

Behavior adaptation:

It defends itself by producing a poison when animal eat its leaves.

Send bad smelly message them in the wind to warn the other near acacia trees to produce the same poison.

2- Kapok tree

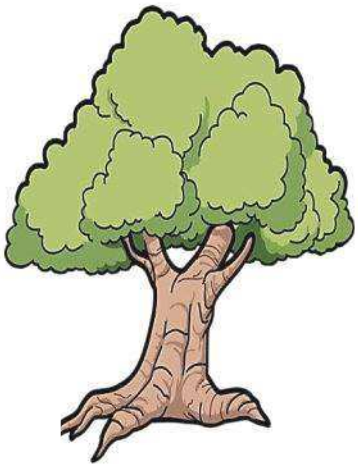
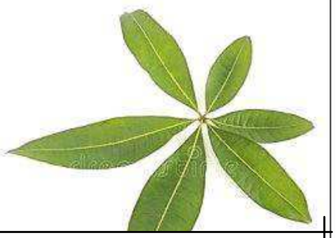


Habitat: It grows in amazon rainforest in Brazil

*** It is rainy most of the year and characterized by strong winds.**

*** It is hard for some plants in this habitat to reach sunlight due to the extra tall trees growing up to 70 meters tall.**

Structural adaptation:

❶ Roots	It has large wide roots (buttress roots) The roots grow up around the trunk To hold the tree firmly in the soggy soil **(in the wet muddy).** 
❷ Leaves	It has hand-shaped leaves with narrow parts To allow wind move gently without tearing (cutting) 
❸ Seeds	**they are fully yellow seeds to be easily carried by wind across the forest.**

Behavior adaptation:

It sends messages by wind to attract bats to its smelly flower.

Lesson ④ Digestive system

***System:** is a group of organs that work together to perform a specific function.

* Digestive system and respiratory system are working together to get energy from food and

Digestive system:

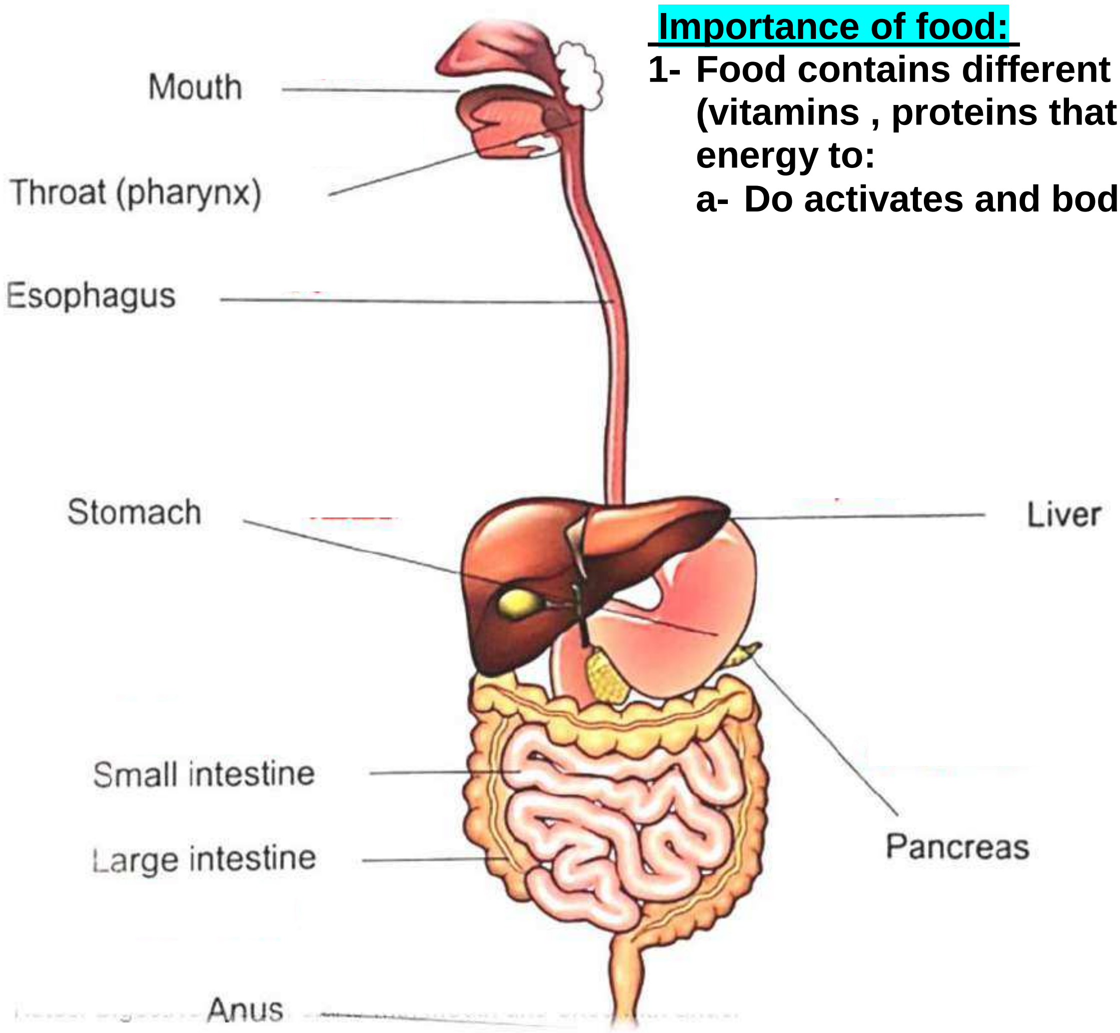
A system breaks food into small parts that a body uses to get energy.

***Digestion process:** is a process of breaking down food into smaller parts that the absorb and use them to get energy and grow.

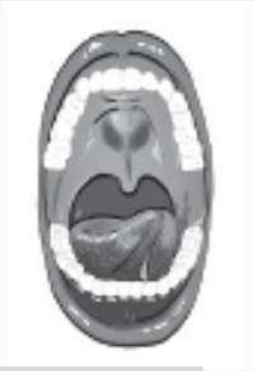
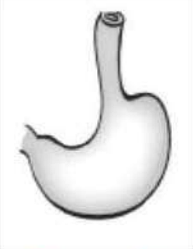
The structure of digestive system

Importance of food:

1- Food contains different nutrients as (vitamins , proteins that give us energy to:
   a- Do activates and body function.


Mouth
Throat (pharynx)
Esophagus
Stomach
Liver
Small intestine
Large intestine
Pancreas
Anus

Notes: *Digestive system starts with **mouth** and ends with **anus**.*

Mouth 	● Digestion of food begins in the mouth. ● Mouth contains: Teeth – Tongue – Saliva. **Function of teeth:** It breaks and crushes food during chewing. **Function of tongue:** It mixes food with saliva in mouth. **Function of saliva:** It facilitates the swallowing of food – digest starch into sugar.
Esophagus	It is a long muscular tube. **Function of esophagus:** It moves the food down into the stomach.
Stomach 	It is a muscular organ. **Function of stomach:** It mixes food with stomach acid to get soupy liquid.

Small intestine 	A long winding tube with length **6 meter**. **Pancreas and liver:** Secrete juice in small intestine to help in breaks food into nutrients. The blood carries nutrients to all body parts. ***The walls of small intestine absorb these nutrients through tiny blood vessel.** **Function of small intestine:** Complete digestion of food – absorb nutrients. *** The body does not benefit from some parts of food (undigested materials) that flow into the large intestine.**
Large intestine 	A tube starts from end of small intestine and ends with anus. **Function of large intestine:** It absorbs **water** from wastes to become solid wastes come out through anus. **✸There is no digestion process occurs in the large intestine.**

To keep digestive system healthy:

1. *Chew the food well.*
2. *Don't eat much fast meals.*
3. *Drink a lot amount of water.*
4. *Practice sports regularly.*

Respiratory system:

A system is responsible for breathing **(respiration).**

During sitting, your breath slows down

While

During running your breath quickens

Respiration process:

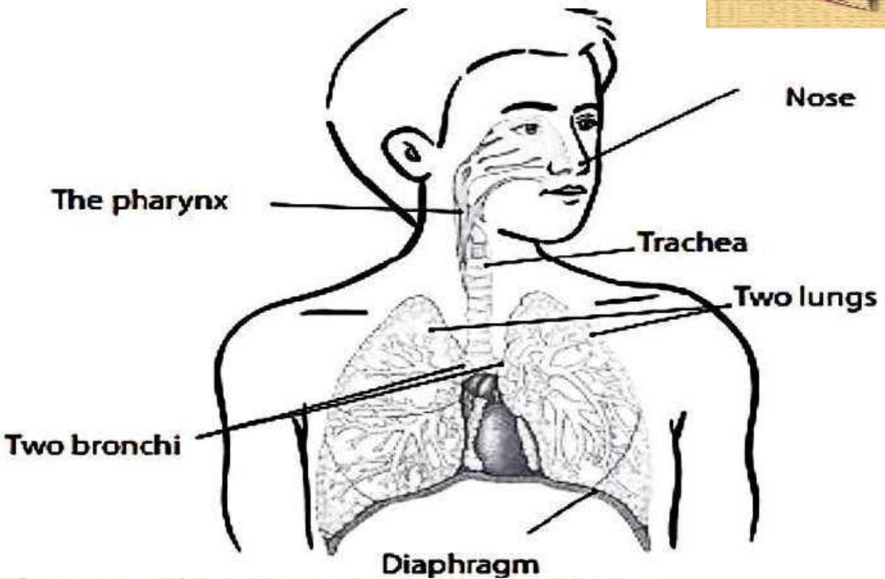
A process by which air carry oxygen gas into the body and get rid of air carry carbon dioxide gas out of the body.

✱ **It is a process of pulling air in (inhalation) and pushing air out (exhalation) of the body.**

The human respiratory system consists of some organs

- Nose
- Throat (pharynx)
- Trachea
- Two lungs
- Diaphragm

How Respiratory system Works


Nose
The pharynx
Trachea
Two lungs
Two bronchi
Diaphragm

How does the respiratory system work ?

Nose :

It is the first organ of the respiratory system through which the air enters the body.

Note

The air can enter the body through the nose and the mouth.

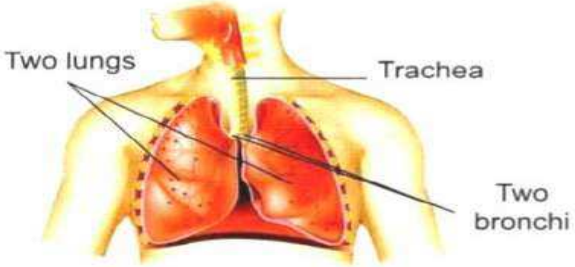
Throat :

It allows the air to pass from the nose to the "trachea"

Nose
Throat

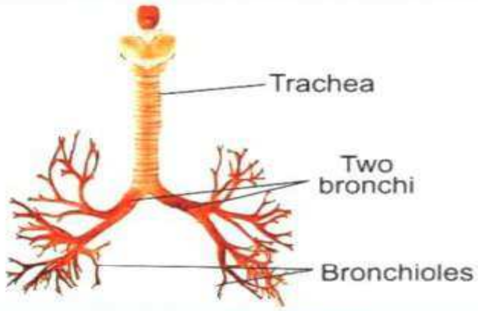
Trachea :

- It is a tube that allows air to pass into the "two lungs" which fill up with air like two balloons.
- Inside the lungs, the trachea is branched into two tubes known as "two bronchi"


Two lungs
Trachea
Two bronchi

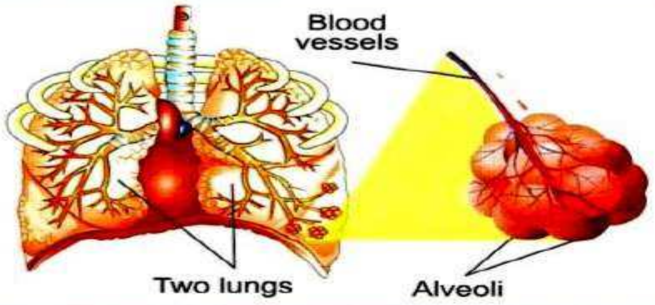
Two bronchi :

- They allow the air to enter the two lungs.
- They are divided into smaller and smaller tubes that look like the branches of a tree known as "bronchioles".


Trachea
Two bronchi
Bronchioles

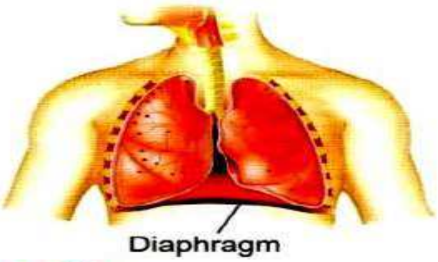
Two lungs :

- Inside the lungs, the bronchioles end with little air sacs, surrounded by blood vessels known as "alveoli".
- Inside the blood vessels, oxygen moves into the blood which carries oxygen around the body to help other organs and systems to work.


Blood vessels
Two lungs
Alveoli

Diaphragm :

- It is a large muscle at the base of ribs which plays an important role in inhalation and exhalation.

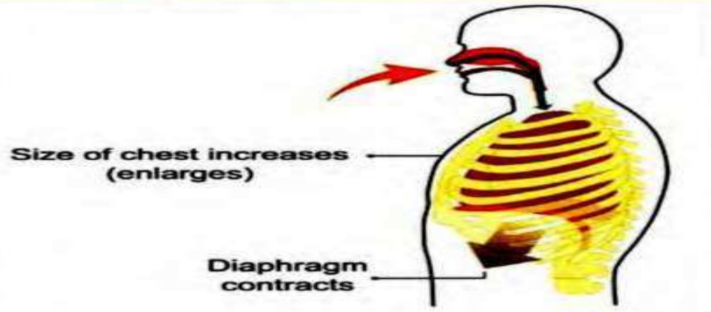
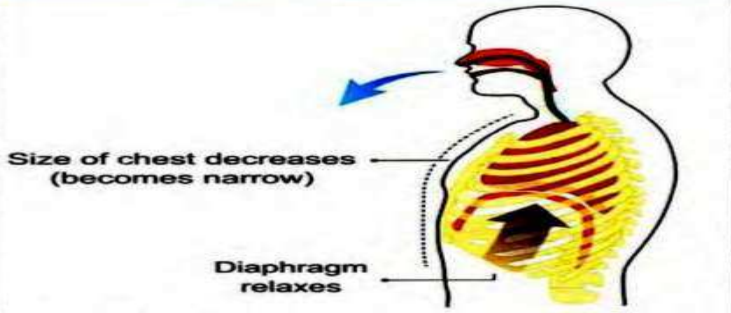


How does the respiration process take place ?

Respiration process includes :

1. Inhalation (breathe in).
2. Exhalation (breathe out).

► Comparison between inhalation and exhalation :

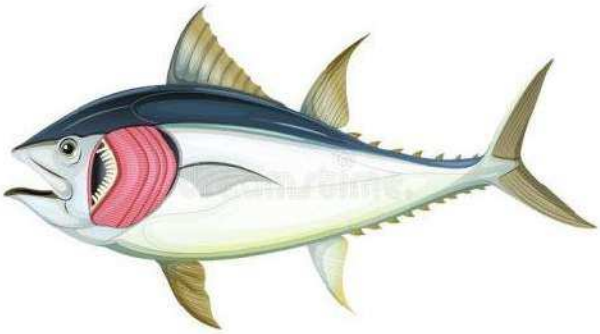
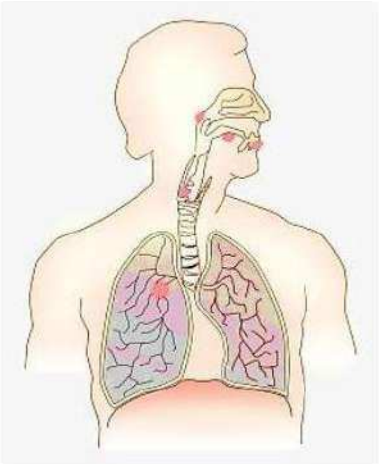
	During inhalation	During exhalation
	 Size of chest increases (enlarges) Diaphragm contracts	 Size of chest decreases (becomes narrow) Diaphragm relaxes
Diaphragm muscle	*The diaphragm contracts (shrinks) and moves downward.*	*The diaphragm relaxes (expands) and moves upward.*
Size of chest	*The size of chest increases (enlarges).*	*The size of chest decreases (becomes narrow).*
Type of air	*The air rich in oxygen gas enters the lungs.*	*The air rich in carbon dioxide gas is expelled out of the lungs.*

To keep respiratory system healthy:

1. *Avoid smoking.*
2. *Eat fruits rich with vitamin ©*
3. *Breathing clean air.*

Lesson ⑤ How fish breathe

Differences between human and fish

• Fish have gills. So, Fish lives under water but it can't live on land. 	• Human has two lungs. So, Human lives on land but it can't live under water. 

Similarities between human and fish

- Both of them inhale oxygen and exhale carbon dioxide.

Blood vessels in the gills :

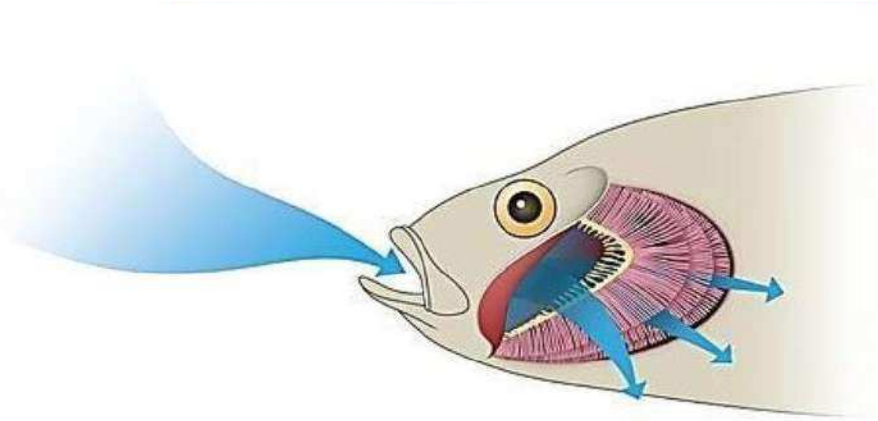
- Blood vessels carry oxygen gas to all body parts.

and release carbon dioxide.

***Gills in fish are found under bony flaps that open and close.**

***Gills are unique structural adaptation that allow fish to breathe under water.**

Adaptation of fish to live under water



1. Fish have gills (unique structural) to allow it to live and breathe under water.

2. Gills are found on sides of a fish's head and has ability to open or close.

3. Water enters mouth of fish and passes a cross gills.

4. Blood vessels in gills carry oxygen to all body parts.

5. Carbon dioxide is released from other part of gills.

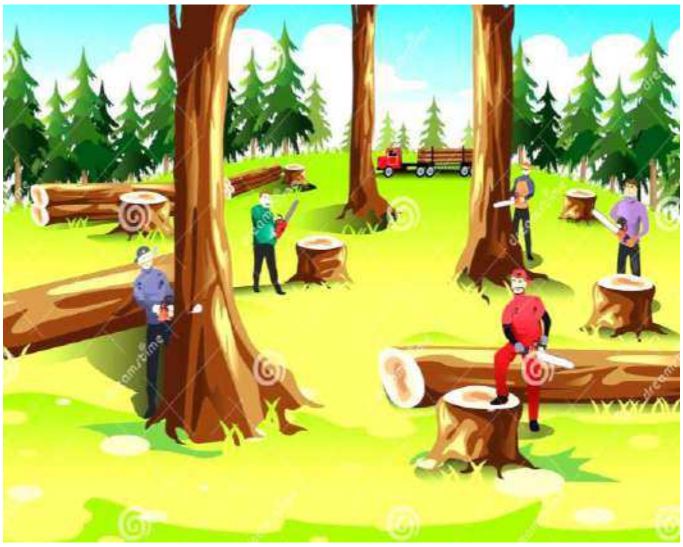
Water pollution affects fish healthy.

Human change the environment

Human activities: cause changes in the ecosystem and negatively affect the nature, so organisms will have to adapt these changes to survive.

★Examples of human activities:

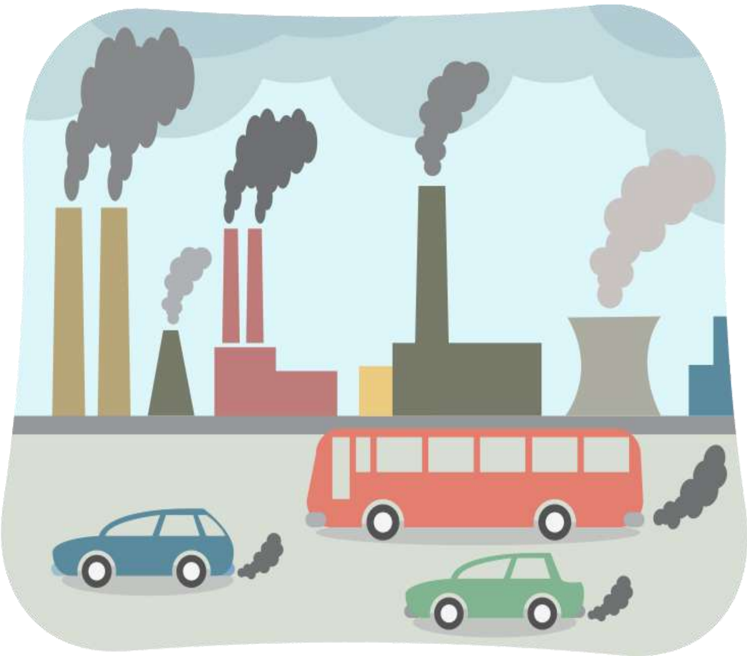
1- Cutting down forests.



2- Farming and clearing lands.

3- Building communities instead of grasslands.

4- Air pollution that is caused due to exhausts from cars and some factors.



5- Water pollution that is caused due to bad habits as throwing waste to waterways and soil.

6- introducing plants and animals into the environment that were never part of the ecosystem.

Note: **changes resulted from human activities can cause the disappearance (extinction) of plants and animals that once lived in an environment.**

Give reason for:

Although the air, water and soil get polluted as a result of human activities, plants and animals can survive.

Some animals can survive by moving to another ecosystem to find what they need.

Plants depend on their seeds to land in better place for them to survive and grow.

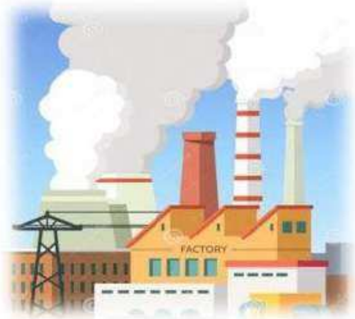
Human also affected by changes in ecosystem:

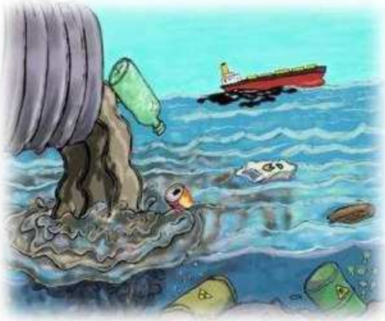
1-**Air pollution (smog):** makes the human hard to breathe.

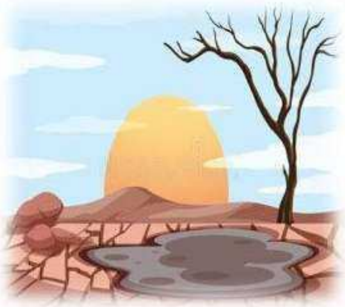
2-**Water pollution:** makes the human hard to find clean drinking water.

3-**Soil pollution**

,water and air pollution : make the crops can't grow.

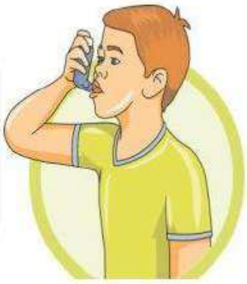






The negative effects of human activities :

Lungs damage – asthma – heart diseases.)



The role of human to help restore ecosystem:

1- Replanting cleared forests.

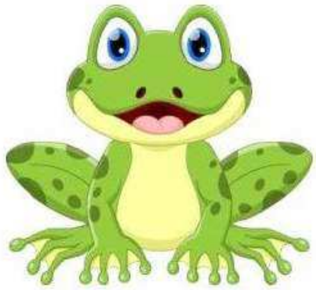
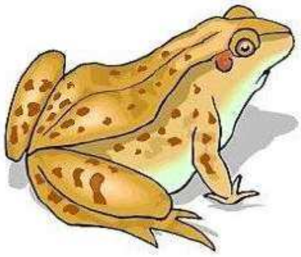
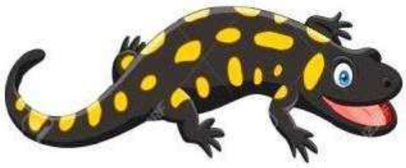
2- Removing air and water pollutants.

3- Keeping plant and animal in these ecosystems

Lesson ⑥ Amphibians

Amphibians:

They are small animals **that live in water and land such as:**

Frogs	Toads	Salamanders
		

They can live in moist environments (rainforest – stream - ponds)

Respiration in amphibians

On land	In water
They can breathe using lungs (like human)	They can also extract oxygen from water using skin organ. (Structural adaptation)

Breathe in through lungs	Breathe in through skin
• On land, amphibians inhale oxygen gas from air through their lungs.	• The bodies of amphibians are covered with skin that allows water and gases to pass through, so they can absorb (extract) oxygen directly from water.

The role of scientists to protect amphibians from extinction:

- **Amphibians need clean water and air to stay healthy, because they are very sensitive to the effects of :**
  - Water pollution.
  - Air pollution.
  - Viruses that can travel through water.

The role of scientists to protect many types of amphibians from extinction :

- **Scientists (biologists) are working to save many types of amphibians from extinction by studying :**
  - How amphibians breathe in air and water.
  - Factors cause air and water pollutions that affect the life of amphibians.
  - What make these animals sick in their environments.

How do people help in protection of amphibians from extinction ?

- **Clean air and water are important for amphibians, so people should :**
  - Avoid throwing waste materials in water.
  - Dispose of chemicals in a correct way helps to avoid water pollution.

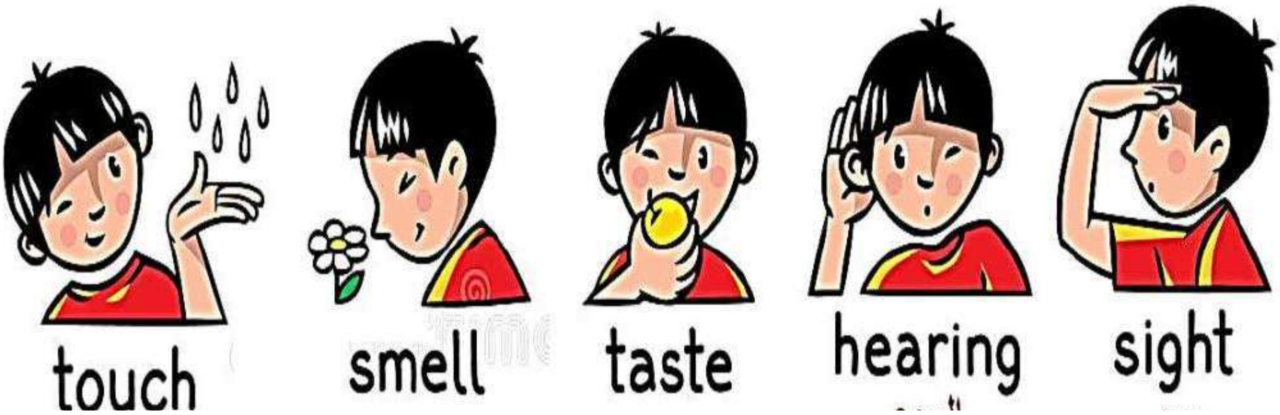
Note

Ninety species of amphibians have become extinct in the last 20 years in addition to 124 other endangered species.

Concept (1.2) Sense at work

Lesson ①

Human have 5 senses



Think with me:

1- We use ……… sense to differ between rough and smooth objects.

2- We use ……… sense to differ between sugar and salt.

3- We use ……… sense for watching TV.

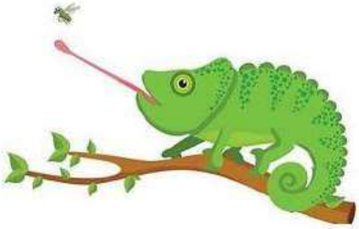
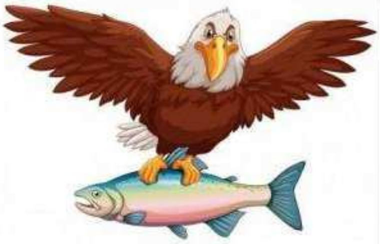
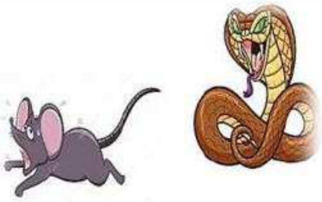
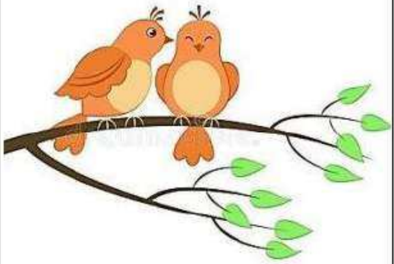
4- We use ……… sense for listen to music.

5- We use ……… sense for knowing the food is bad.

Answers:

1	2	3	4	5
Touch	Taste	Sight	Hearing	Smell

Animals have senses like human that allow them to

	①Adapt with environment and survive.
	② Search for food.
	③ Protect themselves.
	④ Communicate together.

Egyptian mongoose:

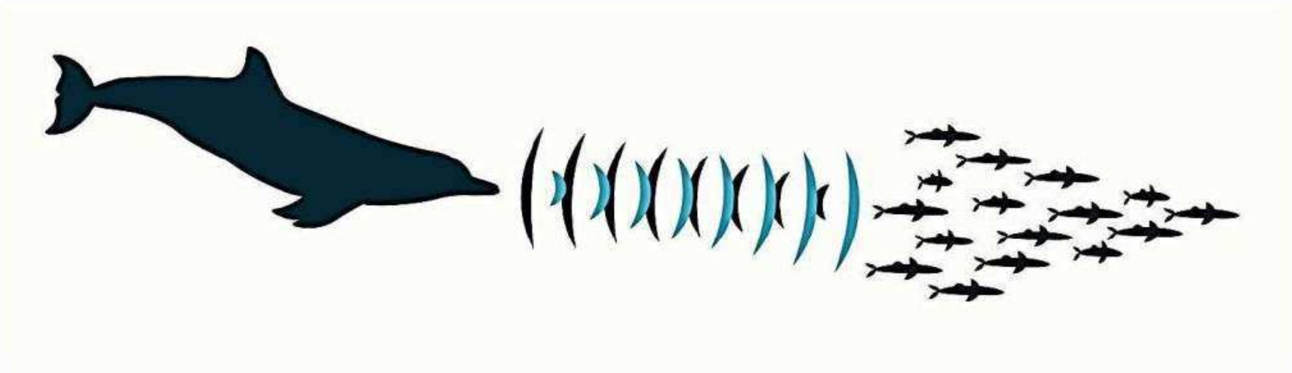
The Egyptian mongoose makes sounds to communicate with other mongooses to move from one place to another or when searching for food.

Humans have ears which are the organs of hearing to listen to music.

Examples for animal senses

		Sense	Purpose
1- Owl:		Hearing & Sight (extra sense)	To find preys in dark.
2- Fox & deer:		Hearing & Sight (extra sense)	To avoid danger.
3- Chameleon :		Sight & taste	To search and taste food.
4- Dogs:		Hearing & smell (sharp sense)	to recognize friends.
5- Monkey:		Five senses	To identify things.

How dolphin locate things under water



Dolphins use a **property** known as " **Echolocation** "

To locate their preys and objects in water.

Echolocation depends on echo to determine the location of other living organisms and objects in the water.

Echo -

is reflection of sound waves back from surface to its source.

How dolphin locate things:

1- Dolphins produce sound waves through water.

2- When these waves hit any object it returns back to dolphin.

in the form of echo.

3. Echo helps the dolphin to locate its prey and other objects.

Lesson ②

SENSORY ORGANS OF NOCTURNAL ANIMALS

Animals that become active at night called

Nocturnal animals

- **Why do some animals become active at night ?**
  1. In extremely hot places, the best time to look for food is nighttime, when it is cooler.
  2. Some animals hunt food that is only available at night.
  3. Some animals depend on darkness to hide from their preys and surprise them.
- **How can nocturnal animals hunt without much available light ?**

  Super sensory adaptations of nocturnal animals allow them to navigate safely and find food in the dark, as shown in the following examples :

Nocturnal animal	Super Sensory Adaptation	Reason
① **Bats**	Use echolocation and hearing sense	To locate their preys.
② **Owl**	They have sharp eye sight sense & hearing sense It can rotate head in all direction. **It has large eyes.**	To locate their preys.
	It has **bowl-shaped face with feathers in its head.**	**To direct distant sounds into the owl's ears.**

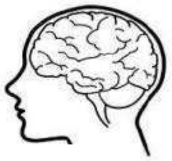
Both bats and dolphins use echolocation to find their food.

Nervous system

- *Five senses organs (**eyes**, **nose**, **ears**, **tongue** and **skin**) is a part of **nervous system**.*

- *Mammals as human, elephant and dog have the same nervous system.*

The nervous system consists of:

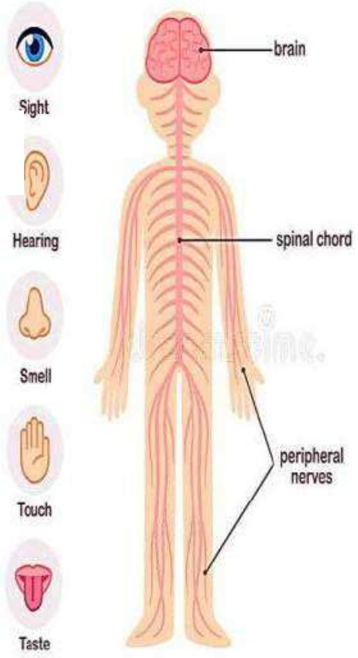
Brain	• The main control center of the body. 
Spinal cord	•
Nerves	• Carry messages from brain to spinal cord or to body parts and vice versa.

- *Brain is connected to spinal cord by nerves that pass through backbone.*

- *Spinal cord branches are distributed through all body parts.*

✸**It is branched into smaller and smaller nerves.**

- *Some nerves are connected directly to brain such as nerves of eye and heart.*


Sight
Hearing
Smell
Touch
Taste
brain
spinal chord
peripheral nerves

How information reach brain from senses:

- *Five sensory organs receive information from environment.*
- *Nerves transmit information from sensory organs to brain*
- *Five sensory organs contain special nerves called sensory receptor.*

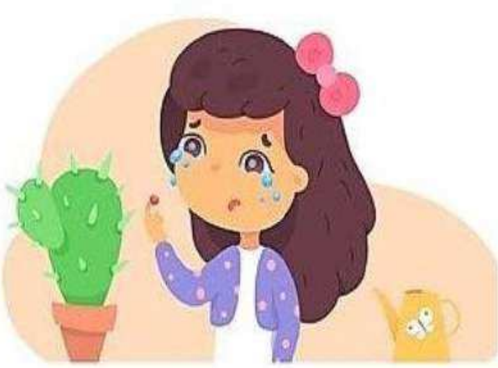
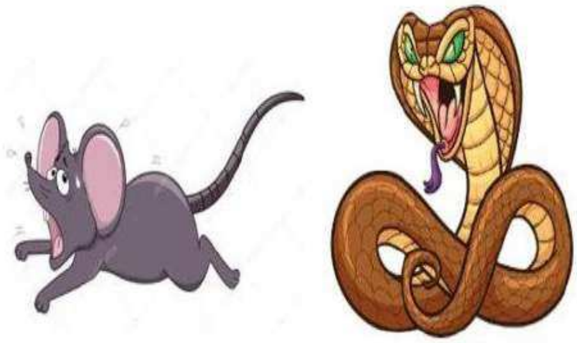
Sensory receptors:

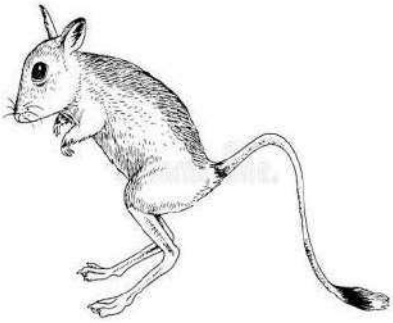
It is nerves found in sensory organs receive information from environment.

Example..Nervous system and pizza:

- *When you smell pizza, you receive this information from sensory receptor in nose.*
- *Sensory receptor back nose send electrical impulse to brain through nerves.*
- *When pizza smell information reaches brain, it produces proper response.*

Sensing of the environment

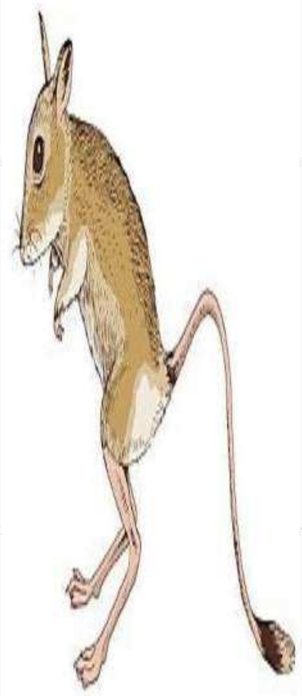
When touch spines of cactus plant. *You Withdraw hand fast.* 	When rat hears a snake. It jumps fast in one second. 
Nervous system responsible for: *Keeps living organisms away from danger.*	



Egyptian Jerboa:

- *It considered from desert rodents.*
- *It is tiny animal with **very large** ears and **small** eyes and long **hind** legs.*

Egyptian jerboa Adaptation:

	**jerboa has long hind legs** To help it jump long distances.
	jerboa's feet and toes have hair To help it catch sand when it jumps in zigzag paths to run quickly from danger.
	jerboa has large ears To help it to hear snakes.

How jerboa's body work together to avoid danger?

On hearing a danger

- *The sensory receptors in the ears send message by nerves to the brain.*
- *Brain translates this information and gives respond by alerts legs to jump.*

The response of jerboa to jump away from danger take less than one second

Reaction Time: *it is the time taken by organism's body to respond to danger.*

✸ **Both human and jerboa avoid danger by relying on sensory receptors, nerves and a brain to sense and communicate messages and they move away quickly from danger.**

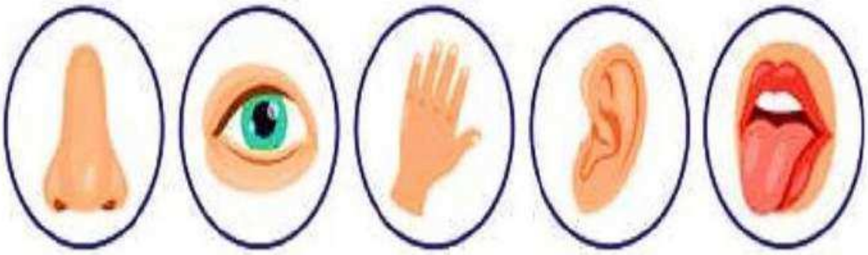
✸ **Jerboa hops in zigzag, so it can escape quickly from danger.**

✸ **Human moves quickly his hand away, when it touches the spines of cactus plant.**

Lesson ③ How nervous system works

How nervous system works?

- The sensory organs (eyes – ears – nose – tongue – skin) collect information about what's happen inside and outside your body.



- Nerves send information from sensory organs to brain.

- Brain processed this information and translate it.

- Brain send message to body to tell it what to do.

The components of nervous system are connected together by **nerves**.

Some messages are transmitted so fast like Reflex action.

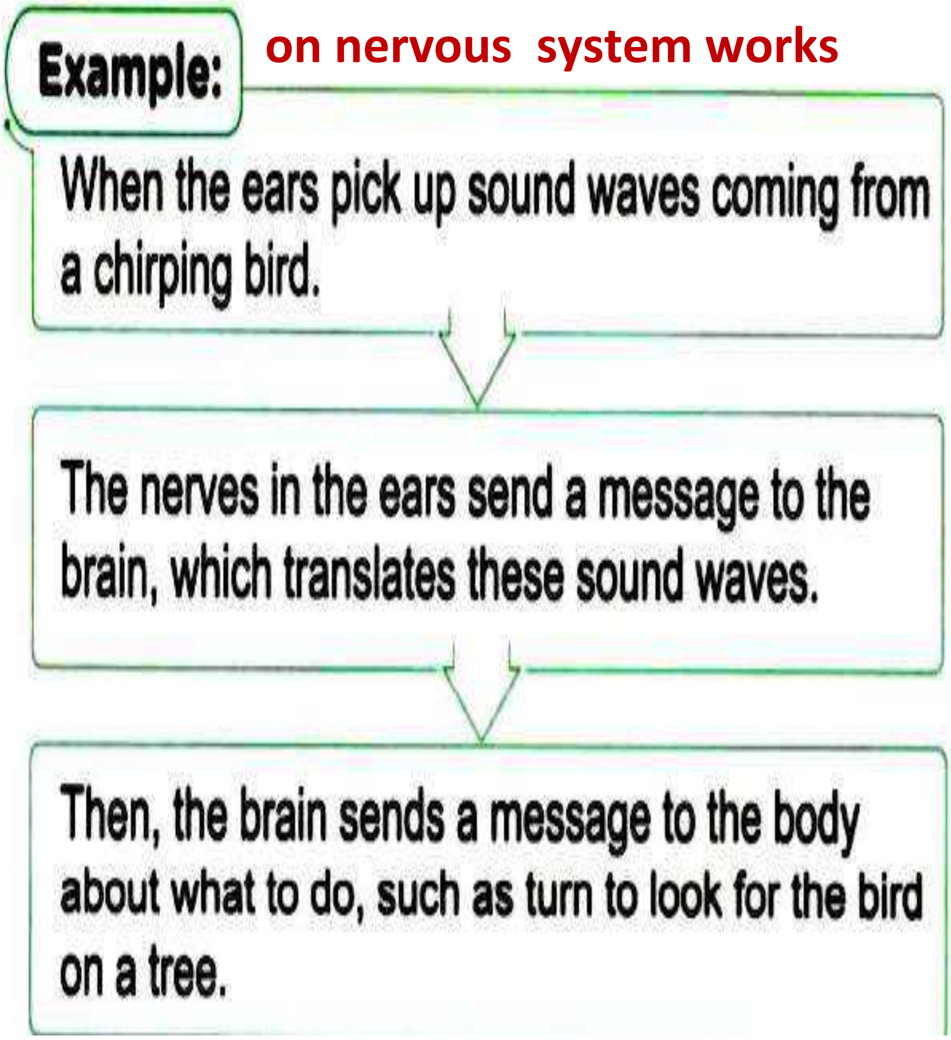
Some messages are transmitted automatically like signal to breathe.

Reflex action: A type of messages transmitted as **so fast.**

Examples of reflex action

1- You **blink** your eyes when something comes near it.

2- Your **hand moves away quickly** when touch a very hot object.

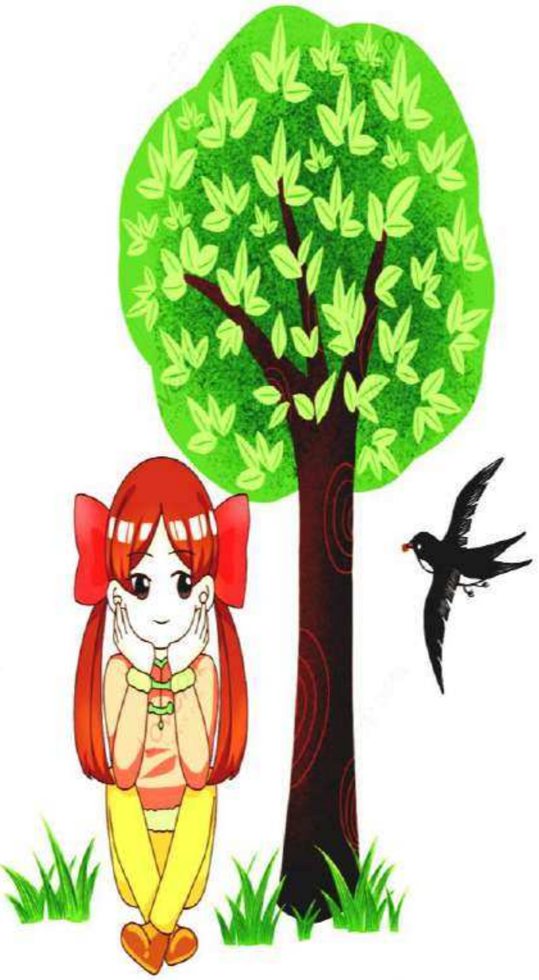


Example: on nervous system works

When the ears pick up sound waves coming from a chirping bird.

The nerves in the ears send a message to the brain, which translates these sound waves.

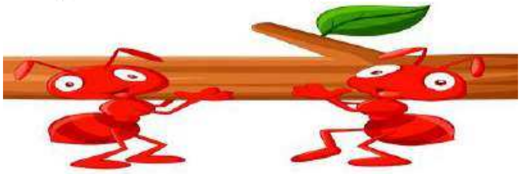
Then, the brain sends a message to the body about what to do, such as turn to look for the bird on a tree.

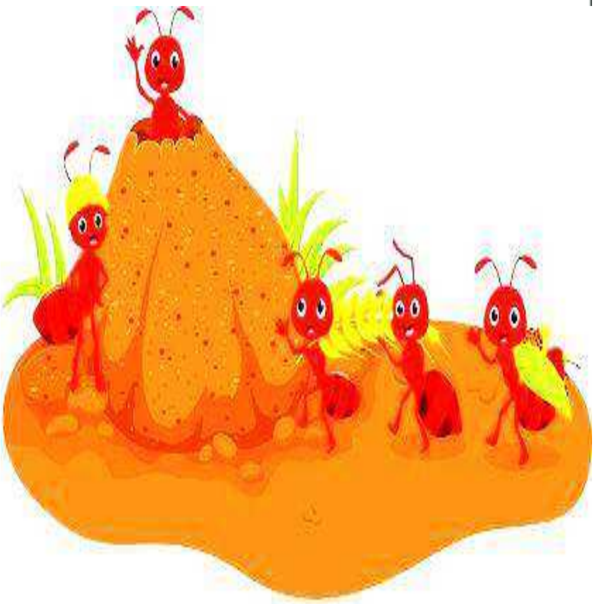


Lesson (4) How animals use communication systems.

- Technology systems allow humans to communicate with each other through :
  - Making phone calls.
  - Sending text messages and e-mails.
- Animals don't use technology systems as we do, but they can still use other systems to communicate with each other.
- We will study ants and humpback whales as examples of these animals.

Ants :





- Ants live in colonies that contain thousands of individuals.
- Groups of ants within a colony have different roles, where they have developed systems that help them divide their work among themselves, so there are nurse ants, scout ants and soldier ants.

How do groups of ants communicate with each other ?

When the food is low, nurse ants send smelly messages to scout ants which are responsible for locating food.

↓

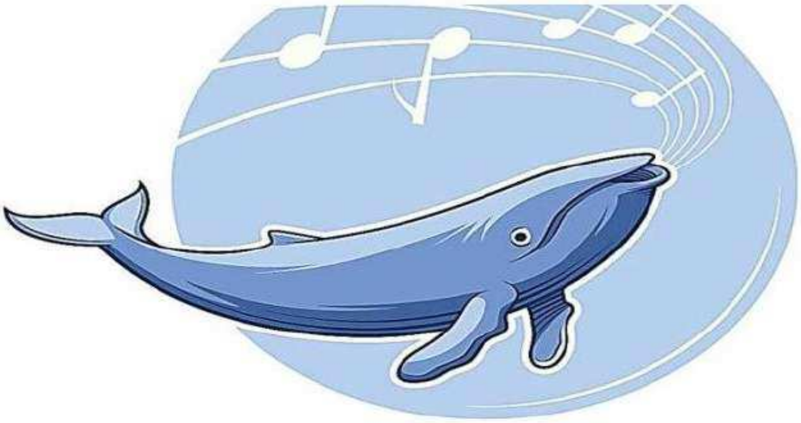
The scout ants respond by sending a smelly message to alert the ants where to find the food.

Note

The soldier ants also use smelly messages to communicate if there is danger nearby.

How Humpback whales communicate:

- *They sing a wide range of **tones** to communicate with each other.*



- *They change their **sound pitch** according to seasons.*

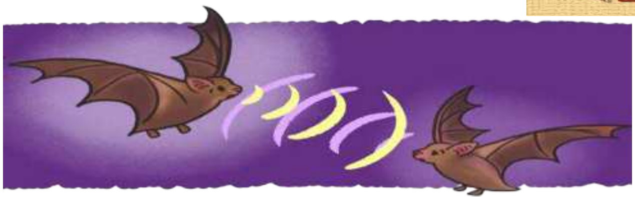
In winter months (**Mating** season).	In summer months (**Feeding** season).
Songs of humpback whales have **high-pitched sounds** that travel better through **cold water**	Songs of humpback whales have **low-pitched sounds** that travel better through **warm water**

Note: ★ **High pitched sound such as: the sharp voice of a woman.**

★ **Low pitched sound such as: rough voice of a man.**

Technology inspired by nature

Bats use sound and their ears in:



1-Communicating with each other.

2- Getting information about their surroundings using their hearing sense.

How does the bat use its ears for echolocation to get information about its surroundings in the dark ?

① Bat makes a high-pitched sound.

② The sound hits something nearby the bat and reflects back to it in the form of "echo".

③ Bat listens for the echo (reflected sound).

④ So, bat knows that there is something nearby.

Bat Inspired technology :

- Scientists have been inspired (get benefited) by the adaptation of bat echolocation to find ways to help blind people detect their surroundings, where :

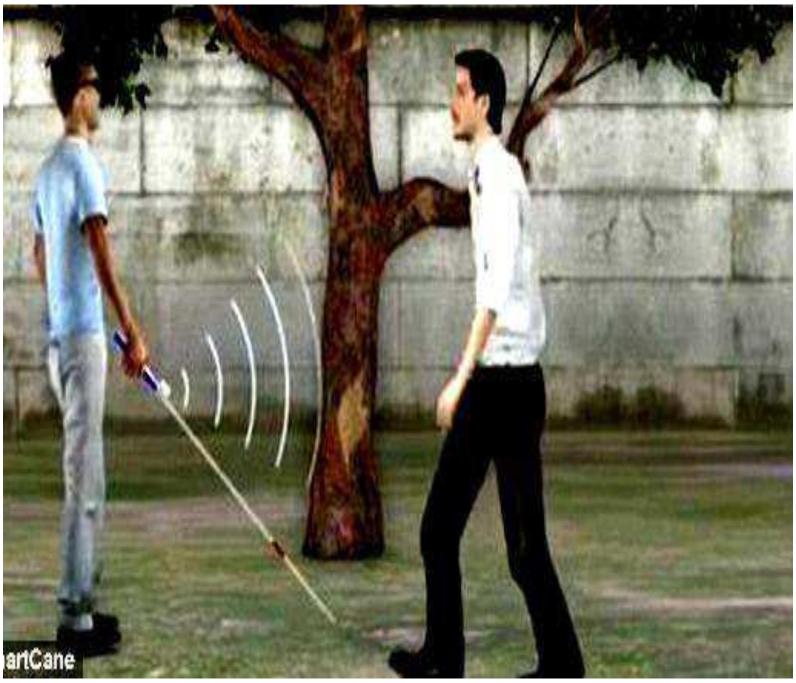
Scientists have created a special cane that emits a high-pitched sound just like bats do.

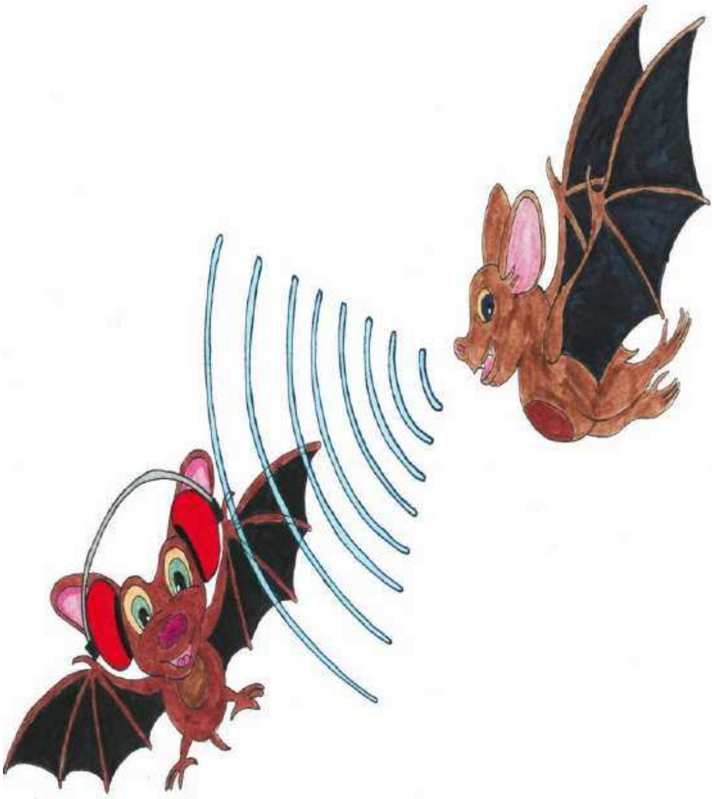
As a blind person is walking with this special cane, an echo of this high-pitched sound is picked up by this special cane.

The echo is turned into vibrations that the person can feel with his thumb.

The vibrations of the special cane tell the blind person the direction of the obstacles and objects around him.

<table>
<tr><th>Special cane of blind person</th><th>Bat</th></tr>
<tr><td colspan="2">Similarities
- The special cane of blind person and bats emit a high-pitched sound that bounces off objects as an echo.
- This special cane and bats receive the echo that can tell how far away objects are.</td></tr>
<tr><td colspan="2">Differences</td></tr>
<tr><td>- This special cane picks up an echo from the sound it emits and changes it into a vibration that can tell the blind person where objects are around him.</td><td>- Bats pick up an echo from the sound they emit but they don't change it into vibrations.</td></tr>
</table>

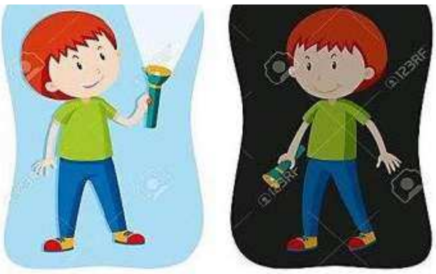


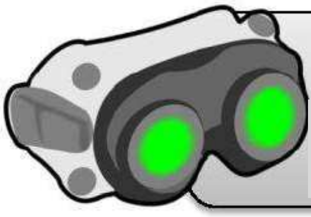


Concept (3) Light and sight

Lesson ①

Can you explain

• Some animals can see in dark and they have spectacular night vision. **as: fishing cat** 	• Human can't see in dark. But they need light to see what happening around them. ✸**Human see objects less clearly in dim (low) light** 



Human eye need a night vision goggle to see in dark.

Human need a source of light to see objects clearly.

Fishing cat: ✸ **Fishing cat is a wild cat that hunts for food at night.**

Its eye glows in the dark *(structural adaptation)*

Because they have a mirror-like membrane on back of the eye that reflects light enter the eye and allowing it to collect more available light.

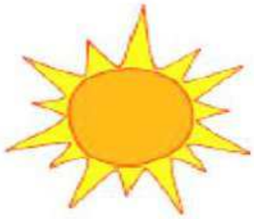
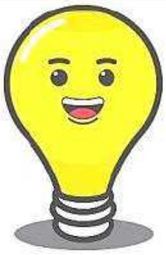
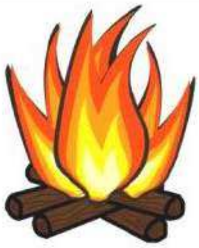
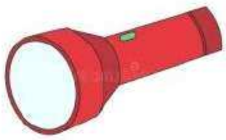
✸ **Fishing cat is a wild cat that hunts for food at night.**

Light: is a visible form of energy that travels in the form of waves.

Human needs light source to see

Source of light

Something that emits its own light.

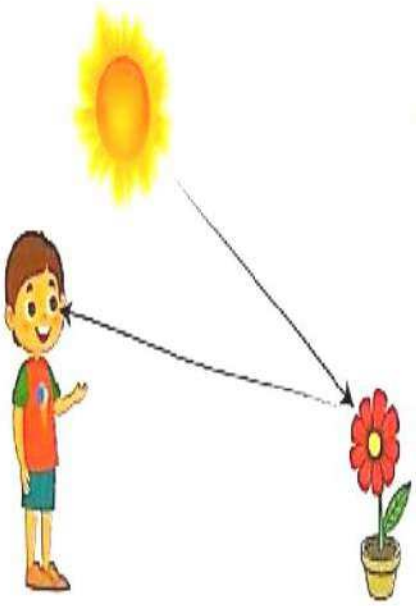
The sun	Electric lamps	Fire	Torch
			

❖ **The sun** is considered the main source of light.

❖ **The moon** is not source of light because it reflects light of the sun.
and doesn't emit its own light.

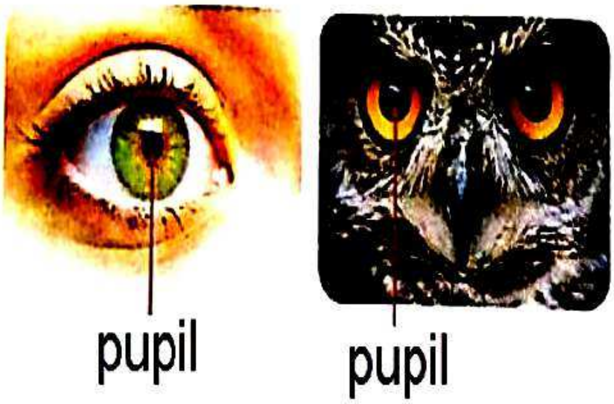
How can we see things?

1- Source of light emits light.
2- Light falls on objects.
3- Light bounce **off** object to eye to see them.
4- Structures in human eyes transmit messages to the brain.
5- Brain forms a picture about what we see.



Nocturnal animals

Nocturnal animals can see better than human in dark.



*Nocturnal animals have **bigger** eyes than human.*

*Nocturnal animals eyes are **more** sensitive to light than human eye.*

*The pupil of eyes of nocturnal animals open **wider** than pupil of human eyes.*

To allow more light to enter their eyes to see well at night.

Nocturnal animals

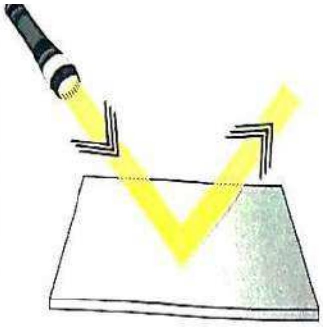
- *They can detect environment around them in weakest light levels.*
- *In complete darkness, they depend on other senses as hearing and smell.* *and touch.*

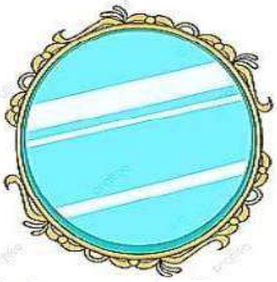
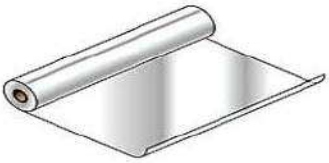
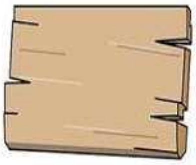
Lesson 2

Light reflection

Light reflection

It is the bouncing **off** light rays when it falls on reflecting surface.



Shiny (smooth) materials	*Rough materials*
Reflect most light rays.	***Reflect small amount of light rays.***
 Mirror  Metals	Paper  Wood Clothes Plastic

Put (✓) or (✗):

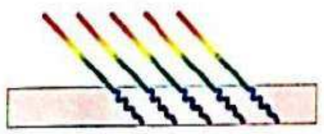
1. Shiny objects tend to reflect light better than rough objects. (   )
2. Wood reflects light more than a mirror. (   )
3. Glass reflects light less than metals. (   )

Interaction of light with matter:

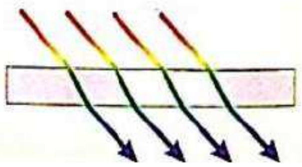
- *Light is a form of energy that travels in straight line in form of waves.*

When light falls on object

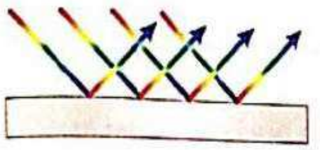
Some light is aborbed



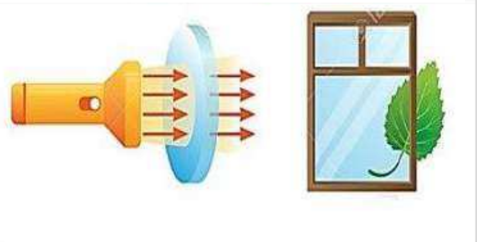
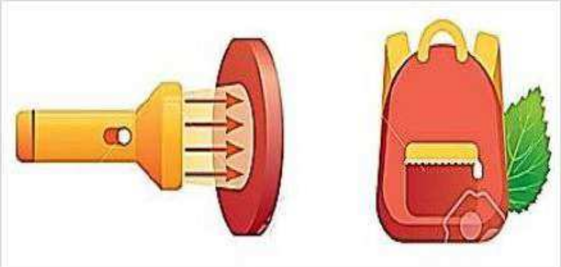
Some light pass



Some light reflects



Materials are classified into:

Transparent materials	***Opaque materials***
	
They are the materials that allow light to travel through.	***They are the materials that don't allow light to travel through.***
Things can be seen behind it. They don't have shadows.	*Things can't be seen behind it.* They have shadows.
Examples	
Glass- Air – water – Window – Lenses.	Human- clothes- skin – moon- Plastic – Wood – Metal.

Shadow happens because

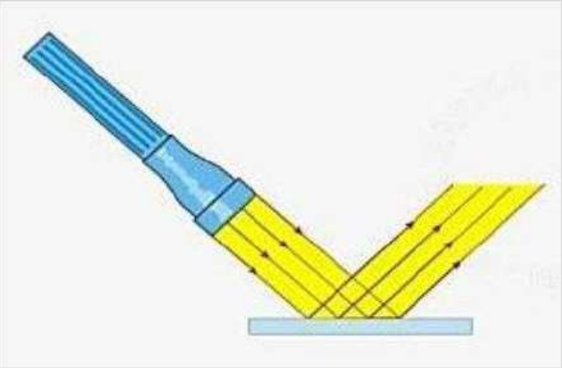
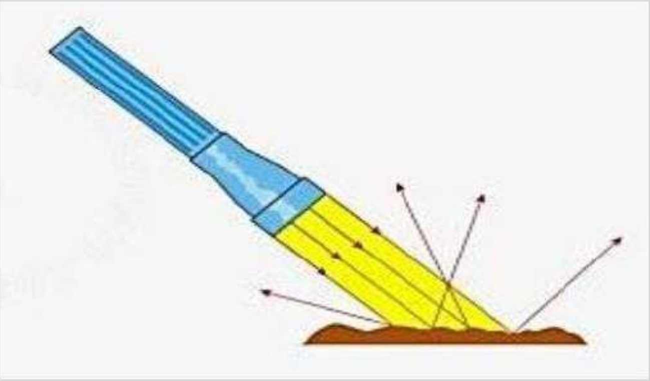
When light hits the body (opaque object), no light will pass through it.

Give reason:

Shadow is formed when light falls on an opaque object.

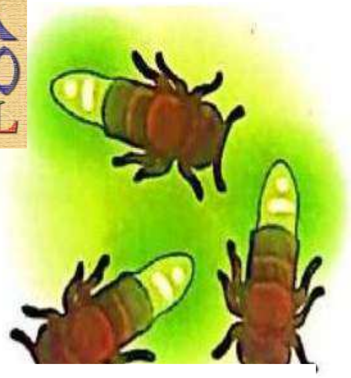
Because light is absorbed or reflected and can't pass through it.

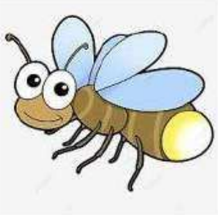
How light reflect:

Regular reflection	*Irregular reflection*
	
If surface is smooth as mirror *Light rays are reflected in same direction* **(in one direction)**	*If surface is rough as wood* *Light rays are reflected in different directions.*

Concept (3) Lesson (3)

Firefly light show: they live on:





on mangroves tree in Thailand.

Fireflies are not flies. they are winged beetles.

- *A chemical reaction happens inside them, so they light up.*
- *Their wings flash at equal time periods to **Warn off predators** or **attract a mate**.*
- *A group of firefly changes their flash pattern when another group comes nearby.*

What happens if:

There is another group of fireflies flashing nearby.

1- **Fireflies will stop flashing their own patterns.**

2- **They will start to match the pattern of the other group.**

Human can use light to communicate such as:

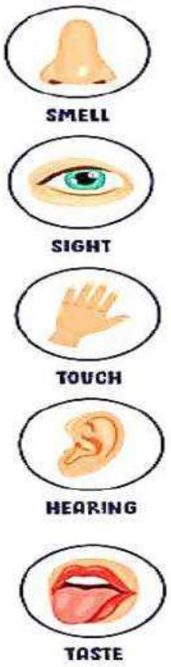
1- **Traffic light**

2- **Lighthouses are used to guide ships.**

There are some similarities and differences between human and animals in communication and transferring information.

Humans	Both	Animals
- Writing - Reading - Language - TV - Cell phones - An electronic reader.	- Displaying light. - High pitched sound.	- Echolocation

Lesson (4) : Transferring information



We use our senses of sight, touch, taste, hearing and smell to:

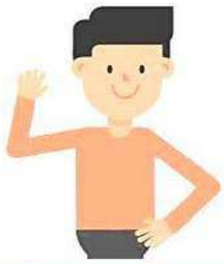
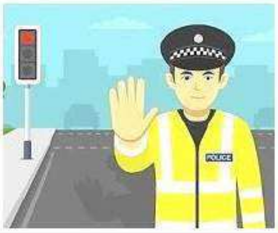
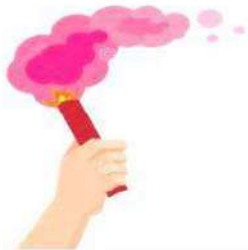
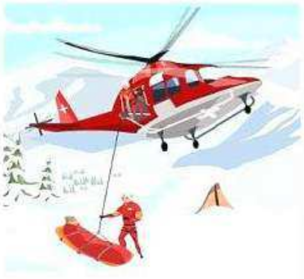
1- Collect information about the environment around us.

2- Communicate or share information with others.

✸Your ears detect sound energy.

✸Your eyes detect light energy.

Examples of information that the eyes receive.

	1- Human waving.
	2- Man stops by seeing a red traffic light.
	3- Using a rescue flare to get help. **✸In the past humans used signals fires to communicate from a distance.**
	4- Hikers use **mirrors** to attract rescue helicopters.

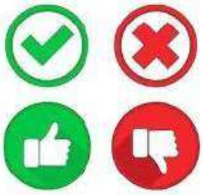
Code

It is a pattern that has meaning.

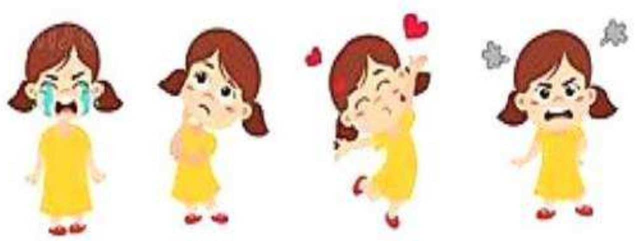
- *Human use codes to transmit information.*

1- **Thumbs-up code:** means that you say "Yes".

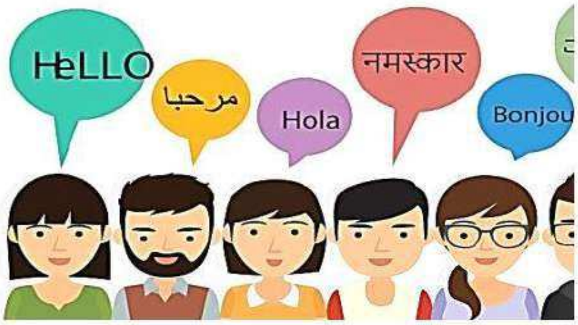
Thumbs-down code: means that you say "No".



2- **Face expressions:**



3- **Languages have different codes.**



4- **Writing code: symbols** form use sense of **sight** to communicate.

5- Music or sounds encode messages.

6- Lighthouses encode information in flashes to tell sailors where they are.

Choose from the following:

(Human – whales – fireflies

1- ……… use **sound energy** to communicate with each other.

2- ……… use **light energy** to communicate with each other.

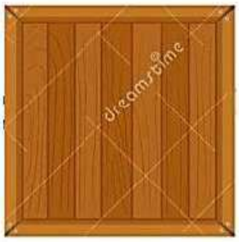
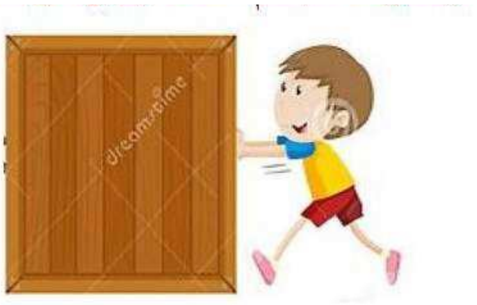
3- ……… use **language** to communicate with each other.

- Sense organs receive information and send it to the brain.

- The brain decodes and interprets the meaning.

Unit (2) Concept (1) Starting and stopping

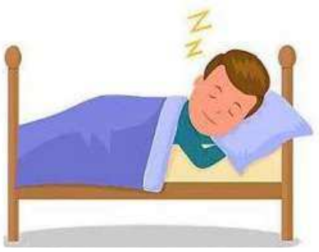
Lesson ① Can you explain?

- Object stays **static** when, It doesn't change its position.  Bec, there is no force acts on it.	- Object **moves** when, It changes its position.  Bec, there is a force acts on it.

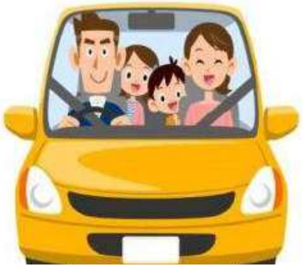
The force causes the motion of objects.

- ✸ **Static objects require a force to move them.**
- ✸ **Forces could be pushing or pulling forces.**

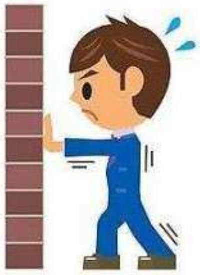
Object is static or in motion



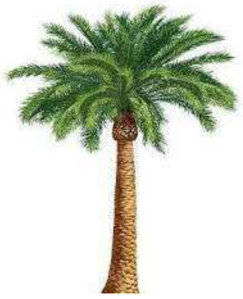
…………………..…



…………………



……………..



……………..

- ✸ **For static object to move, the forces acting on it need to change.**
- ✸ **The player needs energy to push the ball.**
- ✸ **The boy needs energy to pull the bag.**

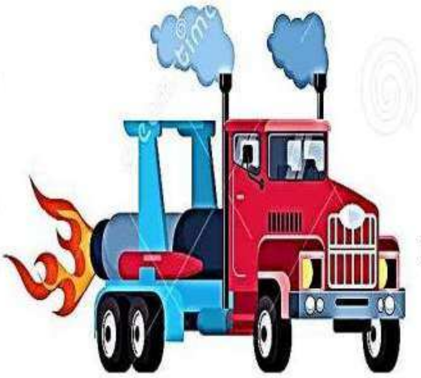
Truck versus airplane

- *Jet (air plane) is **faster** than a truck.*

*Because, the jet's engine is **more powerful** than truck's engine*

Shockwave

(Fastest world truck)



- *It fitted with **three** jet's engines.*
- *Its speed can reaches **500** kilometers per hour.*
- *It is **five time** faster than normal truck.*

How it moves

It moves and record high speeds by the pushing force of powerful engine.

How it stops

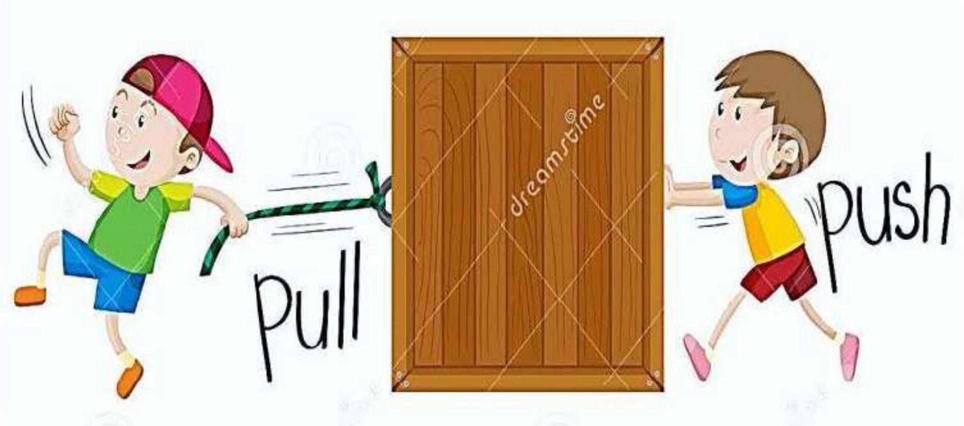
Engineers installed three parachutes that help to slow down truck.

How things move

- *Objects move when a* ***force*** *acts on it.*

  (Pulling or pushing)

① When one force acts on body



Pull force

When object moves toward you.

Push force

When object moves away from you.

✶ **An object doesn't move when no force acts on it.**

✶ **Air force (blowing wind): it can move some objects, such as: leaves of trees.**

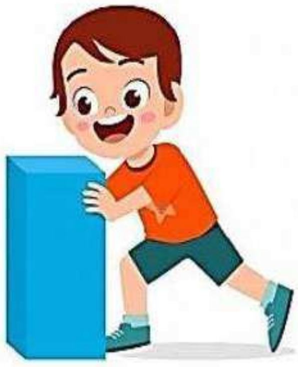
✶ **How did engineers prove that air causes movement ?**

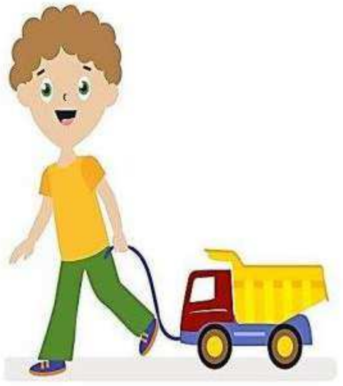
1- Engineers attached a fire extinguisher to a static cart.

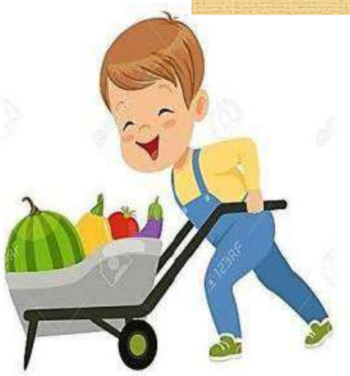
2- When air is released backward from the extinguisher the cart begins to move forward.

3- By increasing the number of extinguishers the speed of The car increases and it covers a longer distance.

Push or pull force



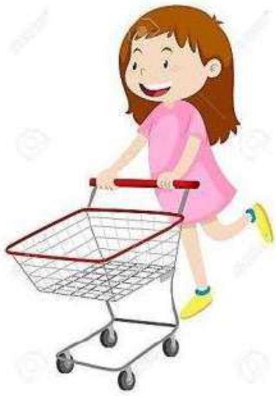


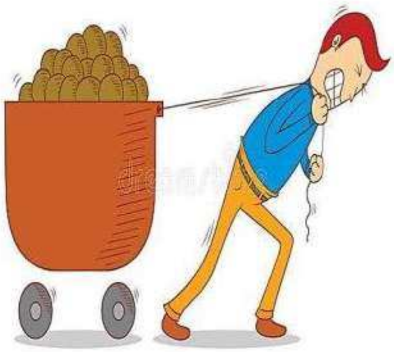


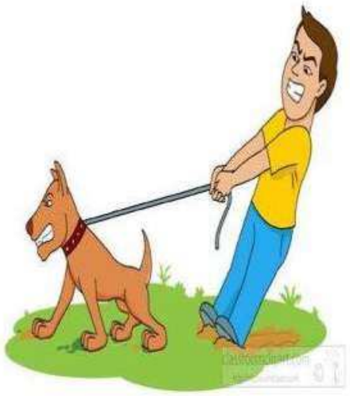
① ....

② ....

③ ....



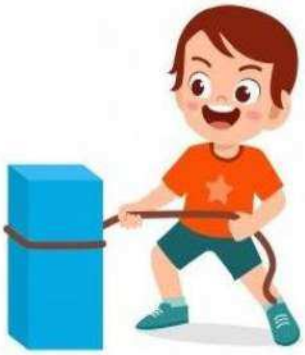


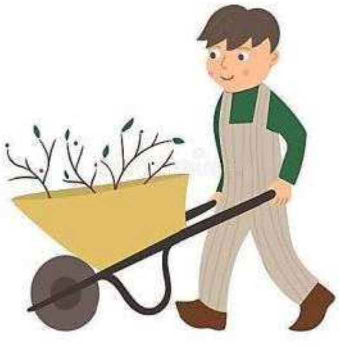


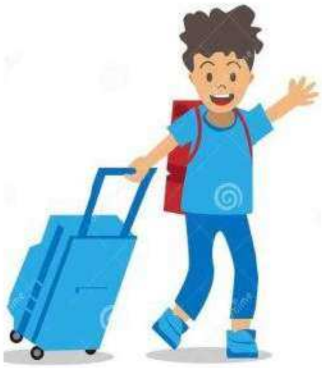
④ ....

⑤ ....

⑥ ....







⑦ ....

⑧ ....

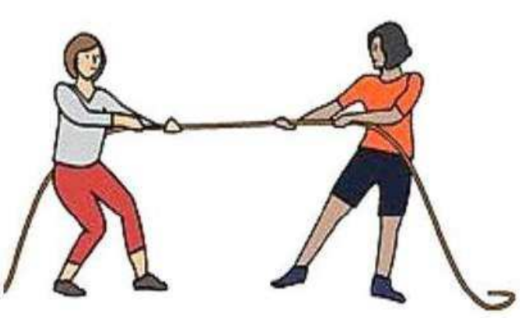
⑨ ....

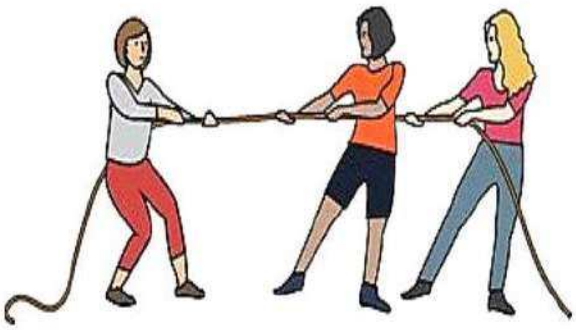
Answers:

Pull	②-⑤-⑥-⑦-⑨
Push	①-③-④-⑧

Unit (2)
Lesson (2)

② When several forces act on body
Tug of war game





Balanced force

Unbalanced force

Object doesn't move
When the forces act on body is **equal**.

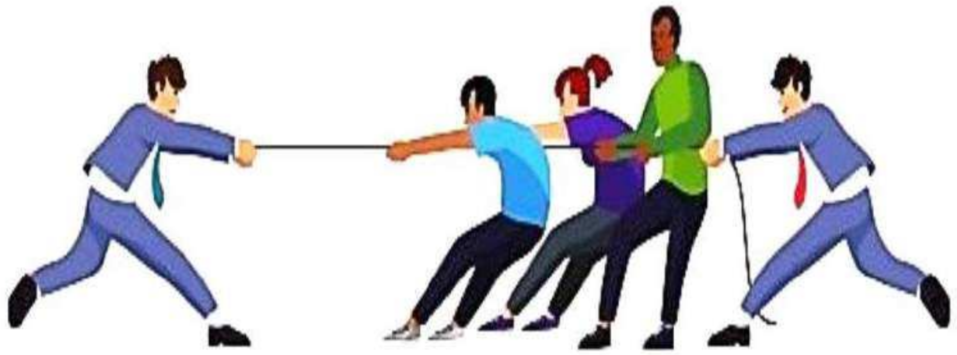
Object moves
When the forces act on body is **unequal**.

✸**If there are unbalanced forces acting on an object, this object will move.**

✸**If there are balanced forces acting on an object, this object will not move.**

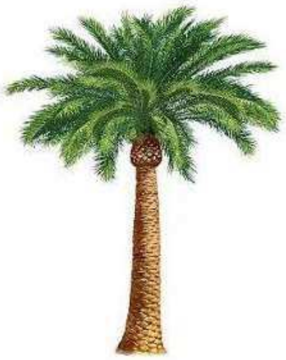
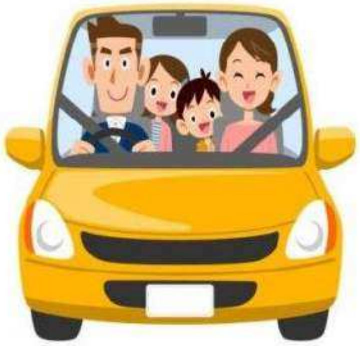
Choose the correct word:

(balanced - move – doesn't move - unbalanced)



The forces act on body is .... ,so object .... t

Objets movement:

• Tree is static,	• Car in a motion,
	
Bec, it doesn't change its position as time passes.	Bec, it changes its Position as time passes.

For any object to be in motion

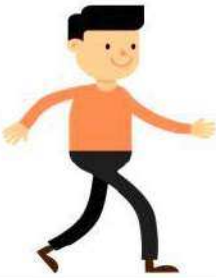
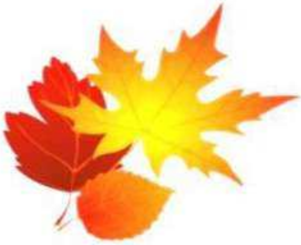
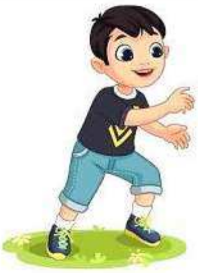
1. A pushing or pulling force must acts on it.

2. A change in position happen as time passes.

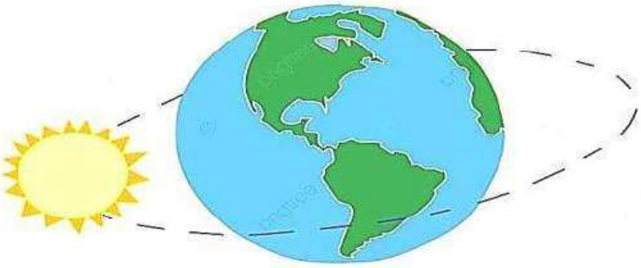
Motion

It is the change in object position as time passes. relative to a fixed point.

Some motion is easy to be seen

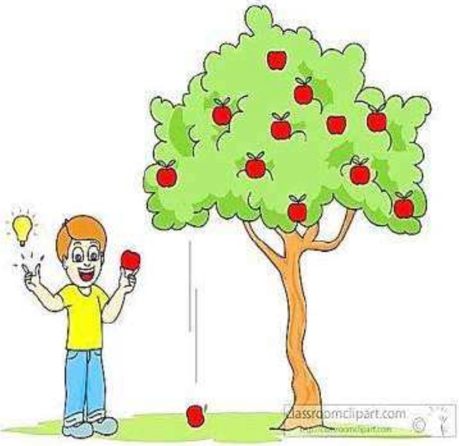
A person walk	*A leaf fall*	*A ball thrown*
		

Some motion is hard to be seen

Rotation of earth around sun


When apple falls down it considered pull force,

while when you catch it it considered push force.



gravity

It is the force that pulls objects downward.

pulls

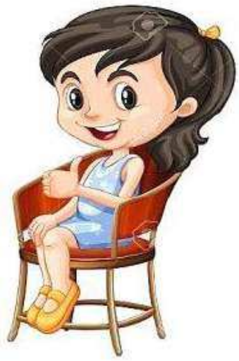
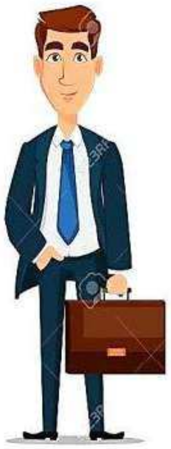
Force

- The world around us is in a constant motion.
- Some things move quickly, while others move slowly.
- All motion, fast or slow is caused by force.

Force

It is a **push** or **pull** that applied on object to change its position.

Examples

	**① Sitting on a chair.** *Gravity is pulling the girl downward.*
	**② Holding objects.** *Arms is pulling the bag upward.* *Gravity is pulling the bag downward.*

The direction of force determined by the total force applied on object.

Unit (2)
Lesson (3)

Stopping motion

Moving objects stops when

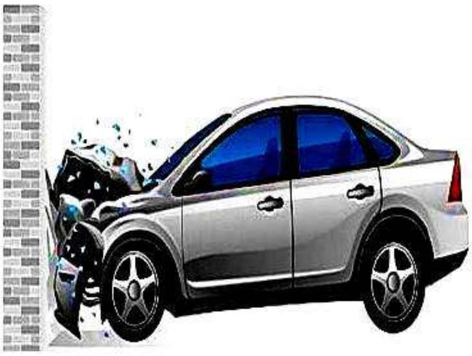
A force acts on it has same speed and acts in opposite direction.

.

Example

- When a moving car crushes a wall, it stops.

Because the wall applied a force to the car with the same amount and in the opposite direction.



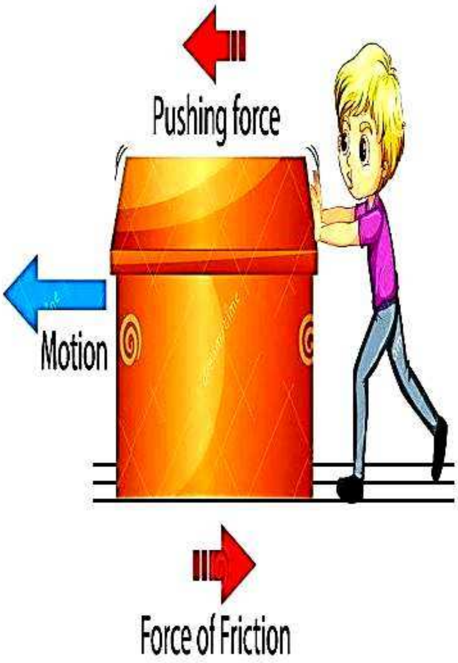
Friction force

It is a force arises between two touching surfaces.

It acts on opposite direction of motion.

It always slow down or stop moving objects.

It is the force that is exerted when objects rub against each other.



Rolling cars

When we push a car gently:

Car moves **slower** and covers **short** distance.

When we push a car hard:

Car moves **faster** and covers **long** distance.

- ***By increasing the acting force on body:***

Its speed and kinetic energy increase and distance travelled increase.

- ***By applying the same force on different objects:***

- ***Small car*** *move for* ***long*** *distance.*
- ***Big truck*** *moves for* ***short*** *distance.*

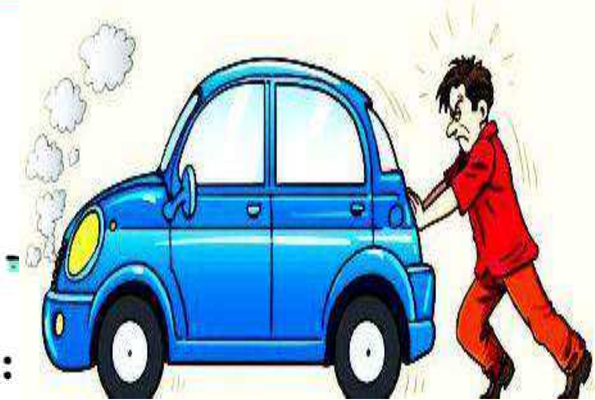
Lesson 4

Energy, work and force

The relationship between energy, work and force :

Example :

- The man exerts a pushing force on the car to move it.
- So, this force transfers energy from his body to the car.
- When he moves the car, this means that he is doing work.



From the previous example, we can conclude that :

- Force transfers energy from one object to another.
- The work done is equal to the amount of energy transferred by a force that is used to move an object.

Force Transfers → **Energy** Enables us to do → **Work**

Note

Force and energy are different, but they are related to one another, where force is the effect that changes energy and allows it to do work.

✱**Force:** it is the effect that affects an object and changes its state.

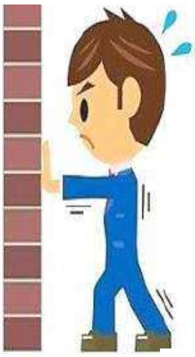
✱**Force** transfers energy from one object to another.

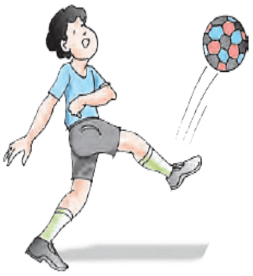
✱**Force :** is something that changes energy so that it can do work.

✱**Work :** is the energy transferred by a force to move the object.

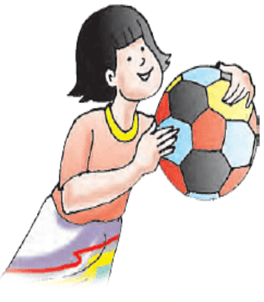
The boy doesn't do work.

Because wall doesn't moves.





It can make an object move.



It can slow down or stop a moving object.

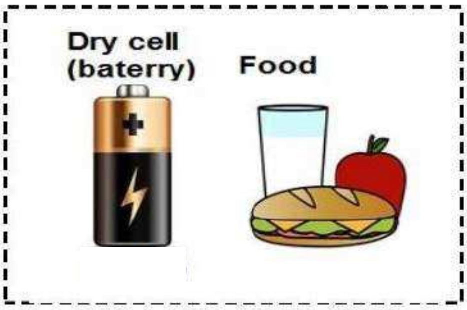
Lesson ① Can you explain

Energy around us

- *Energy is very important in our life and they found everywhere around us.*

① Chemical energy

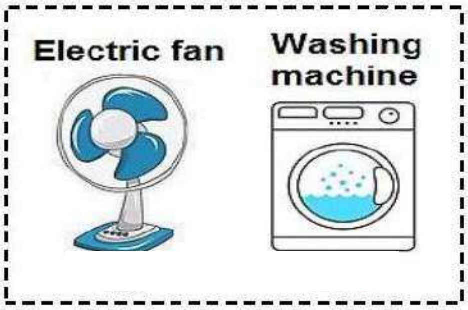
Stored in


Dry cell
(baterry)
Food

② Kinetic energy

(moving energy)

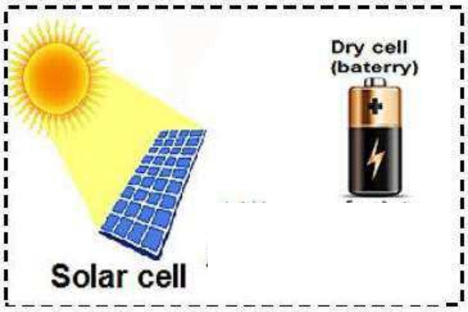
Produced from


Electric fan
Washing machine

③ Electric energy

It helps us in operating electric devices.

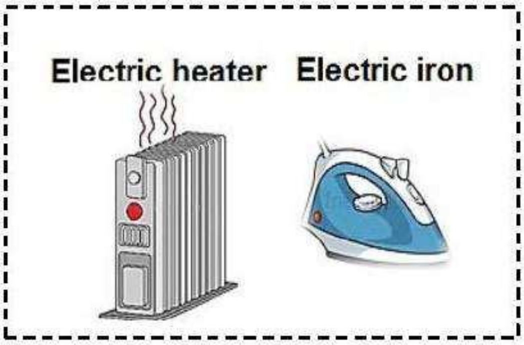
Produced from


Dry cell
(baterry)
Solar cell

④ **Heat (thermal) energy**

It helps us in cooking.

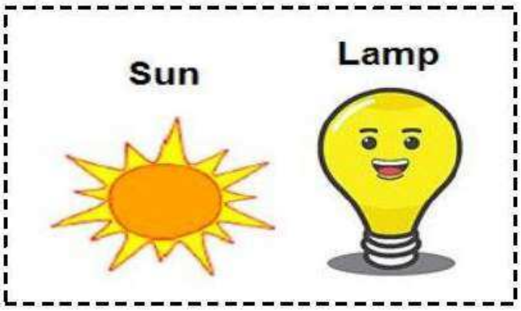
Produced from



⑤ **Light (radiant) energy**

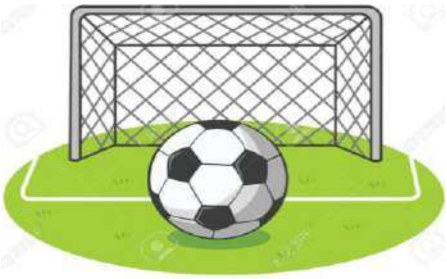
It helps us in operating electric devices.

Produced from



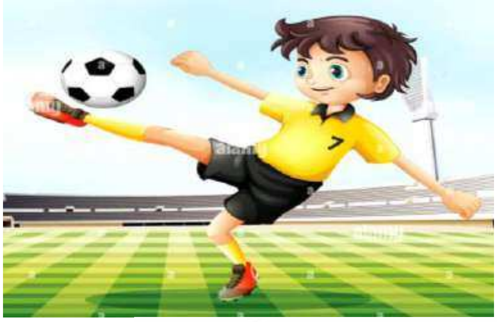
Examples: when a football player kicks the ball:

1- The ball on the ground has no energy.



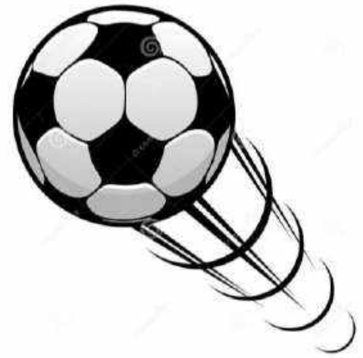
2- Kinetic energy transfers from player's foot,

So the ball moves.



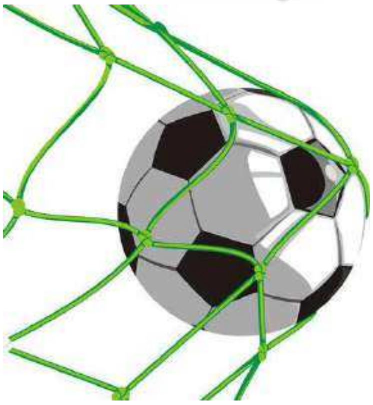
3- The ball moves in the air

because it gains kinetic energy.

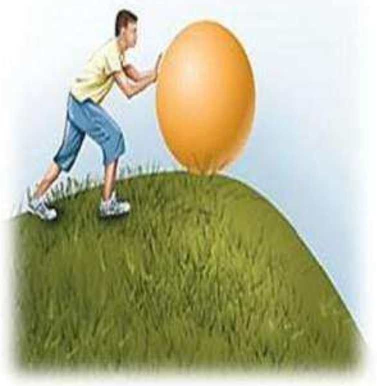


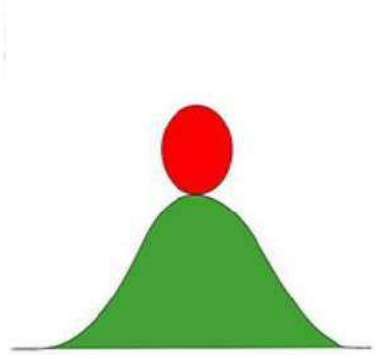
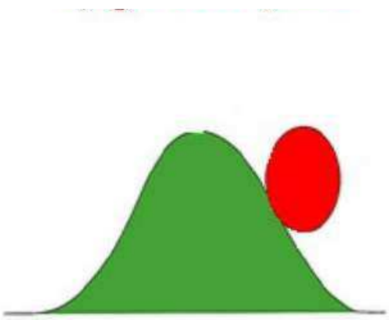
4- Kinetic energy transfers from the

ball to the goal net which vibrates.



- *The force is needed to make any object moves.*
  - Static objects have no kinetic energy.
- *When object moves it gains* kinetic energy.



When an object moves up a hill, it stores potential energy. 	When an object moves down a hill, it potential energy changes into kinetic energy. 

Static object on the ground has no energy.

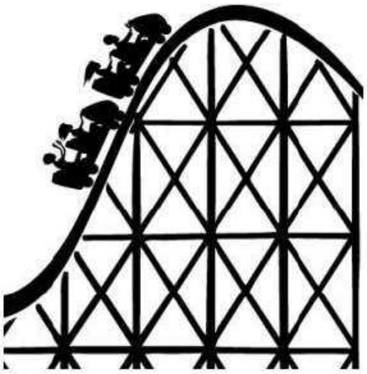
- ***Moving objects*** *have motion (kinetic) energy.*

- ***Static objects*** *have stored (potential) energy.*

Roller coaster game

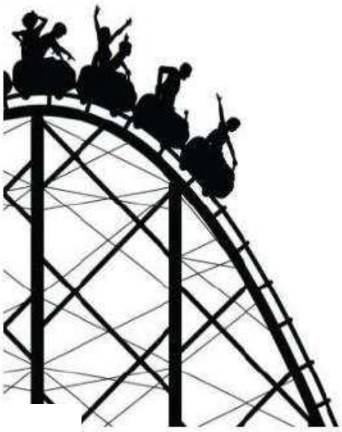
*Roller coaster equipped to **electricity** and **motor** that help car to move up the ramp.*

① During moving upward



Stored (potential) energy increase gradually.

② At hightest point (at ramp)



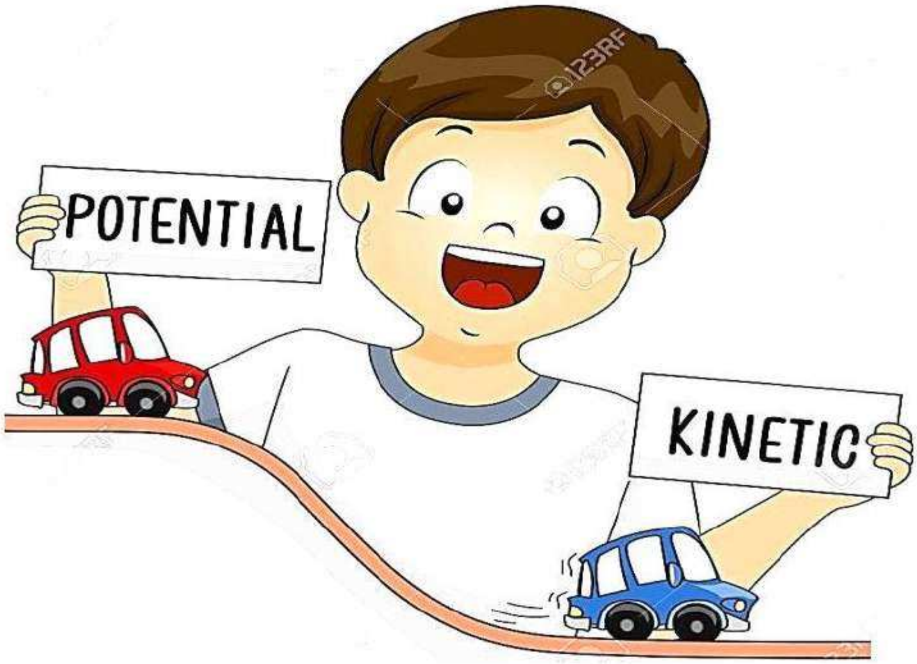
Stored (potential) energy become maximum.

③ During sliding down

Stored (potential) energy converted into Motion (kinetic) energy.

As we move down the speed increase and motion (kinetic) energy increase.

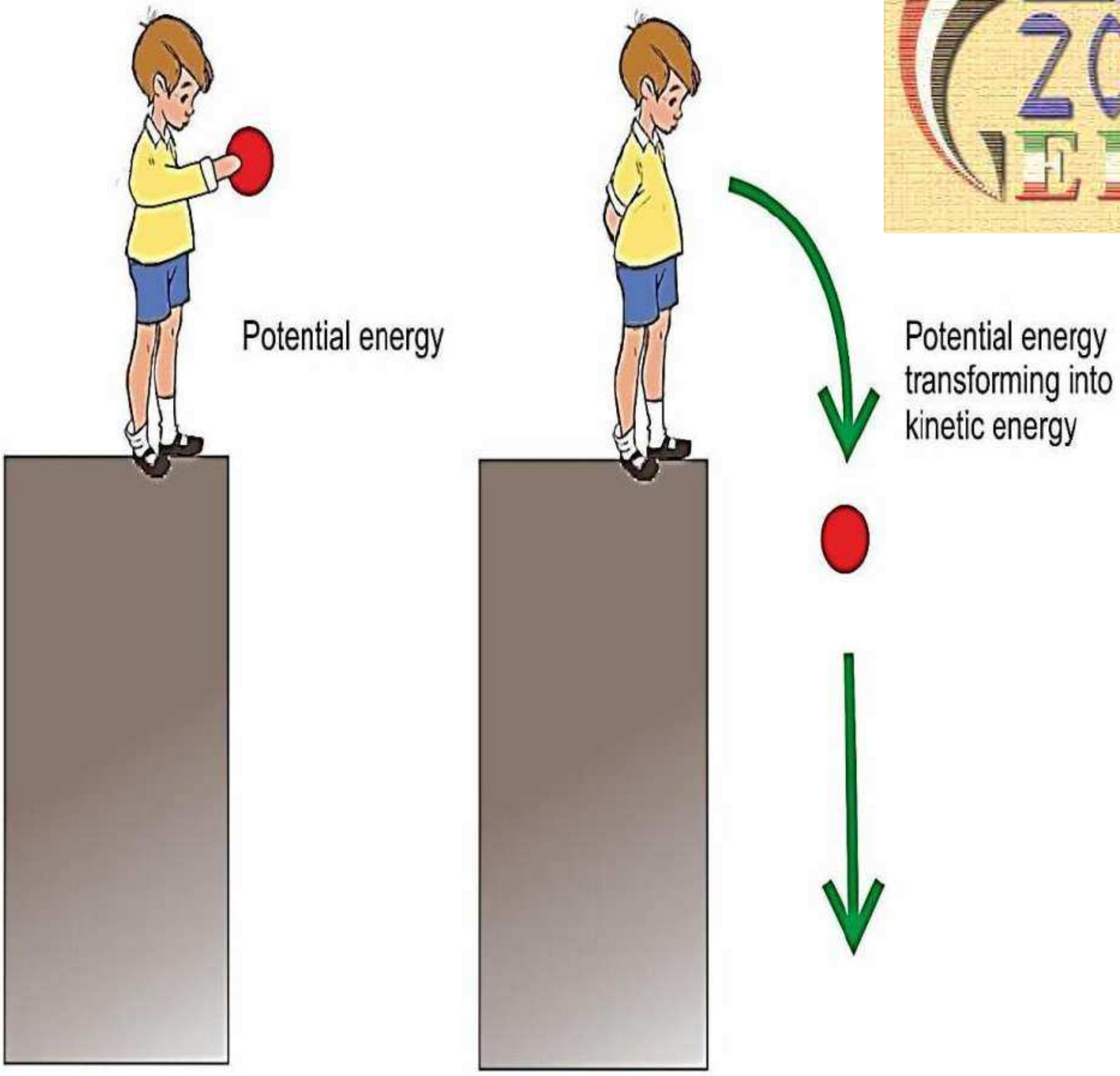
Potential (stored) energy	**Kinetic (motion) energy**
⇩ Increase	⇩ Increase
during moving **upward**	during moving **downward**

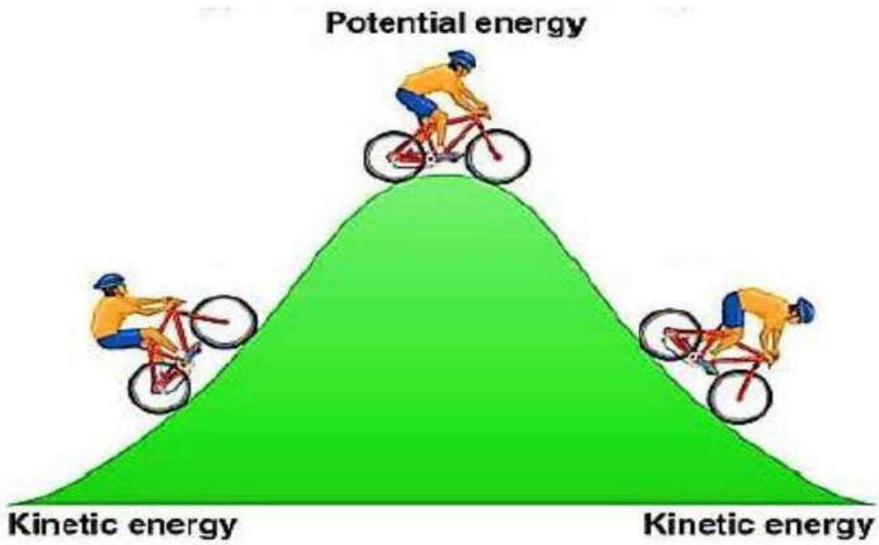


- ***Potential (stored) energy is maximum:*** *At the highest of hill.*

- ***Kinetic (motion) energy is maximum:*** *At the ground of hill.*

- *Object lose its kinetic energy when object stop.*


Potential energy
Potential energy transforming into kinetic energy


Potential energy
Kinetic energy
Kinetic energy

Lesson (2) : Energy basics

✶When the boy pushes the box:

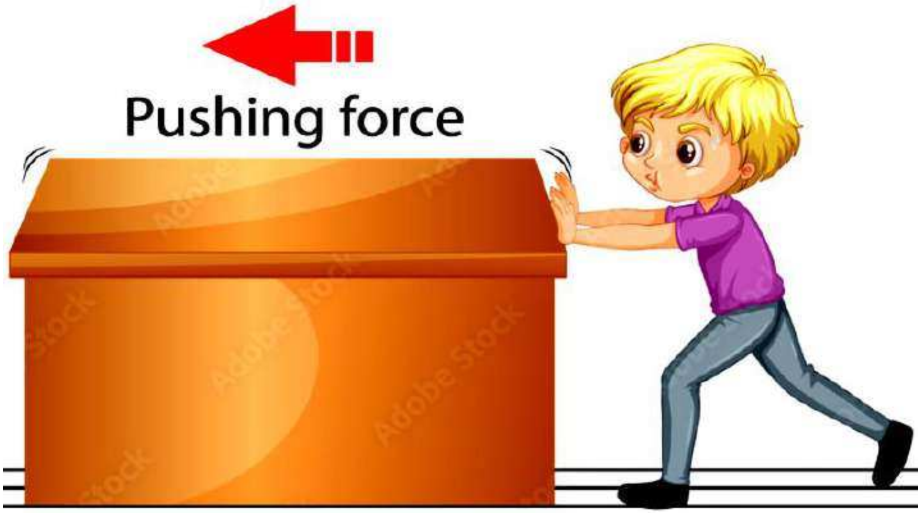
1- The boy needs energy to move the box.

2- The boy exerts pushing force on the box.

3- When the box moves, work is done

✶**Energy:** It is the ability to do work or to make things happen.

✶**Work:** It is the force that causes an object to move.



✶**Energy can be stored and changed from one form to another.**

Ex. Roller coaster.

✶**Most forms of energy can't be seen.**

Ex. Heat energy – sound energy – chemical energy – electrical energy

✶**The work done by energy can be seen and measured**

Ex. The goal net vibrates because kinetic energy transfers

From the ball to it.

Scientists classified energy into two types:

Kinetic energy & Potential energy

Potential energy is the energy stored in object due to the work done on it

- *Example: When you raise a ball:*

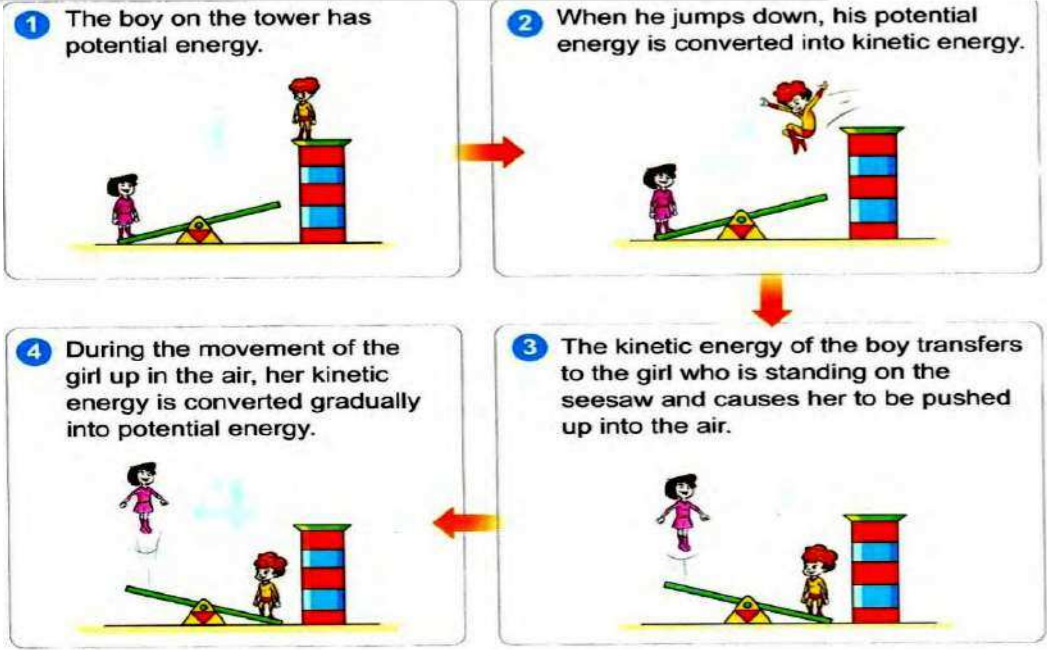
Kinetic energy is the energy object has due to its **motion**.

- *Example: When you leave ball to falls:*

- *Potential energy increases by increase the height from Earth surface.*
- *kinetic energy increases by increase the speed of object.*

✱As the speed increases, the kinetic energy increases.

✱Potential energy means that an object is ready to do work or to be active.



① The boy on the tower has potential energy.

② When he jumps down, his potential energy is converted into kinetic energy.

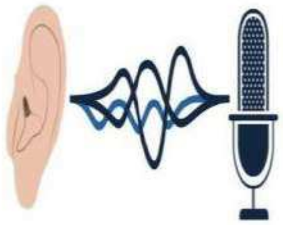
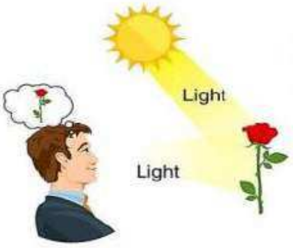
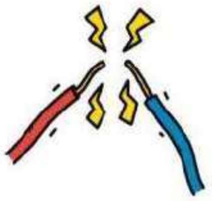
③ The kinetic energy of the boy transfers to the girl who is standing on the seesaw and causes her to be pushed up into the air.

④ During the movement of the girl up in the air, her kinetic energy is converted gradually into potential energy.

Lesson ③ Forms of potential and kinetic energy

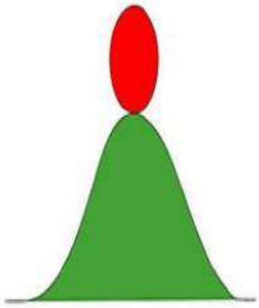
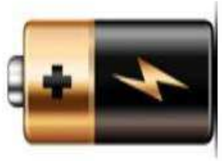
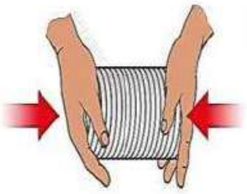
- *All forms of energy can be classified into potential & kinetic energies.*

❶ Forms of kinetic energy

	**① Sound energy** *Sound waves move through air and reach ear causing hearing.*
	**② Light energy** *Light waves move through air and reach eye causing seeing.*
	**③ Electric energy** Electricity moves through wire.
	④ Heat energy Vibration of water particles during boiling.

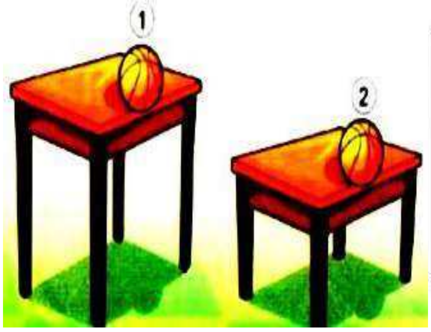
Kinetic energy depends on: speed and mass

② Forms of potential energy

	**① Gravitational potential energy** *A ball at the top of hill* **stores** *gravitational potential energy.*
	**② Chemical potential energy** A battery stores chemical potential energy, this energy isn't used until the battery is connected to any device.
	**③ Elastic potential energy** *Spring store elastic potential energy in it.*

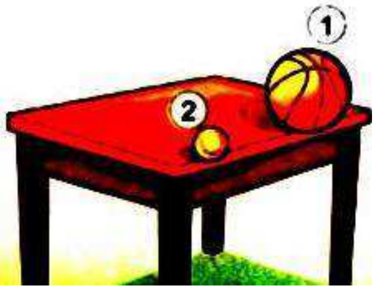
By increasing the height from the Earth's surface, the potential energy increases.

By increasing the mass, the potential energy increases.



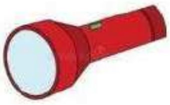
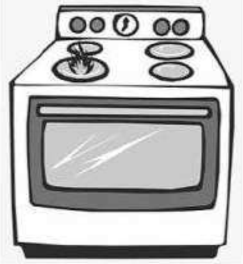
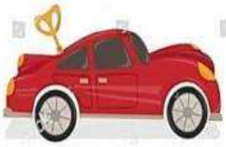
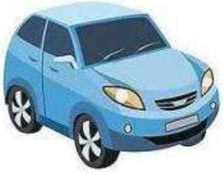
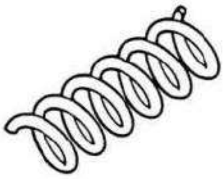
Potential energy depends on:

1. The **height** of the body.
2. The **mass** of the body.

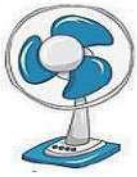
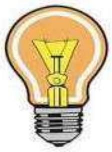
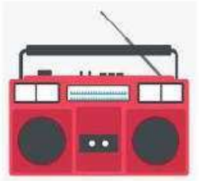
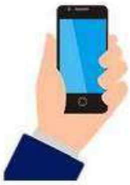
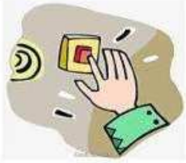
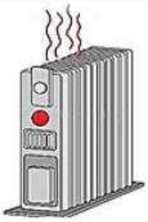
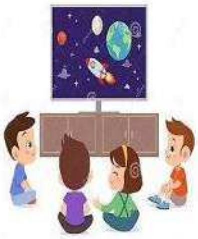


Energy transformations

- ✸Energy is found everywhere around us.
- ✸Energy can be changed from one form to another.
- ✸Energy transferred from an object to another..

Tool		Energy used	Energy produced
1-Torch		Chemical energy (Stored in battery)	Light and heat energy
2-Gas oven		Chemical energy (Stored in natural gas)	Heat energy
3-Spring toy car		Potential energy	Kinetic energy
4-Real Car		Chemical energy (Stored in gasoline)	Kinetic energy Heat energy Sound energy
5-Spring		Potential energy	Kinetic energy

Think with me:

Tool		Energy used	Energy produced
1-Electric fan			
2-Electric lamp			
3-Radio			
4-Cellular phone			
5-Door bell			
6-Electric heater			
7-T.V			

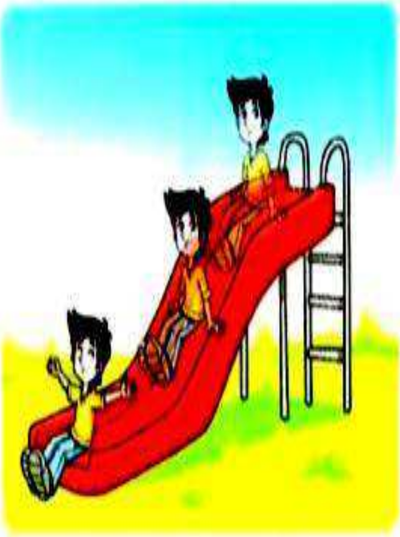
Changing of potential energy into kinetic energy:

Example ①:

- A child at the top of a playground slide has potential energy.

↓

- When the child moves down along the slide, the **potential energy changes into kinetic energy.**

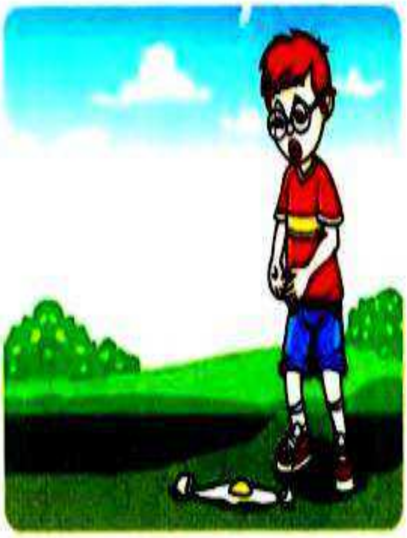


Example ②:

- The egg has potential energy when it is in the boy's hand.

↓

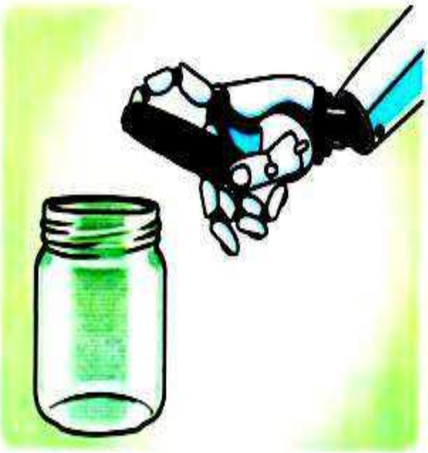
- The egg has kinetic energy as it falls down.



Easy life tool

Example :

- **The tool :** A robot hand
- **Its function :**
  Opening the jar cap that it is hard to be opened.
- **The source of energy :**
  The robot gets power from batteries when it is turned on.

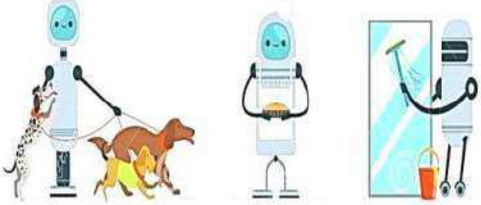


The changes of forms of energy inside the robot :

The chemical energy stored in the batteries. → changes into → Electrical energy in the robot hand. → changes into → Mechanical (kinetic) energy when the robot hand moves to open the jar.

- ***A robot (with battreries)***

  *was invented to make tasks **easier**.*



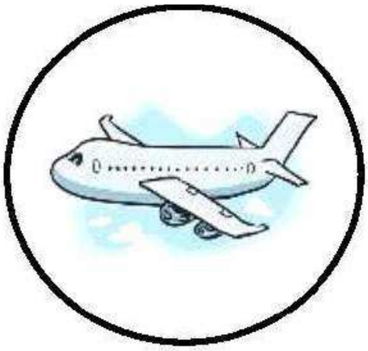
1. *Chemical energy (stored in battery) is converted into electric energy*
2. *Electric energy is converted into kinetic energy to make tasks easy.*

- **Energy is not created or destroyed when transferred from the battery to the robot hand.**
- **Energy is converted from one form (chemical energy) to another form of energy (mechanical energy) when the robot hand opens the jar.**

Unit (2) Concept (3) Speed

Lesson ① Can you explain

- If you want to travel from Alexandria to Aswan in short time, we use ……



Airplane is faster because it covers longer distance in shorter time.

How to measure object speed

- *To measure speed we must know:*

The distance that object travelled. 	**The time** taken to travel this distance.

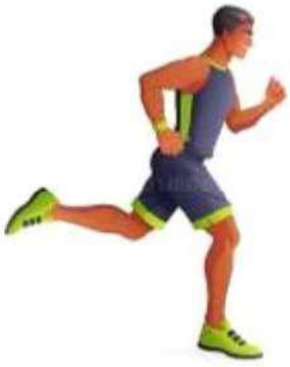
Speed measuring unit –

Meters per second

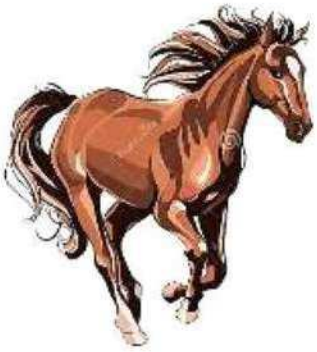
Kilometer per hour

① Relation between speed & distance
(At same time)

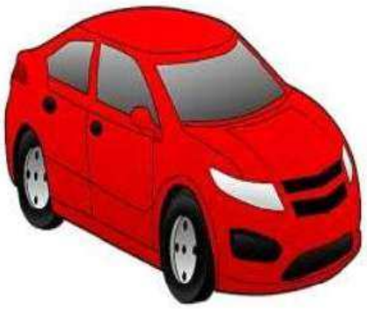
- *ALL the following object covers different distances in same time (4 minute).*



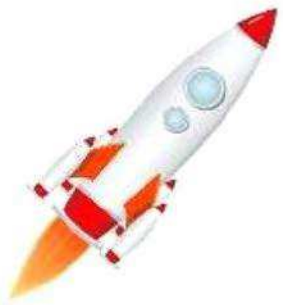
1.5 Kilometer



3 Kilometer



6 Kilometer



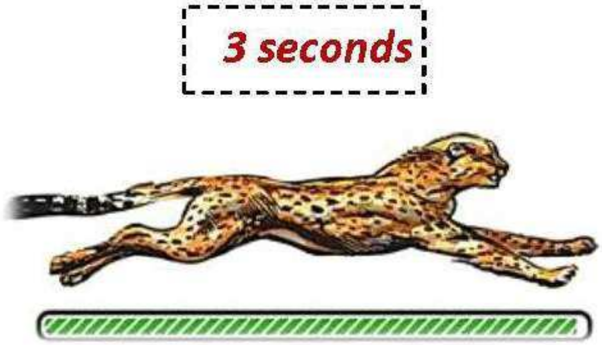
400 Kilometer

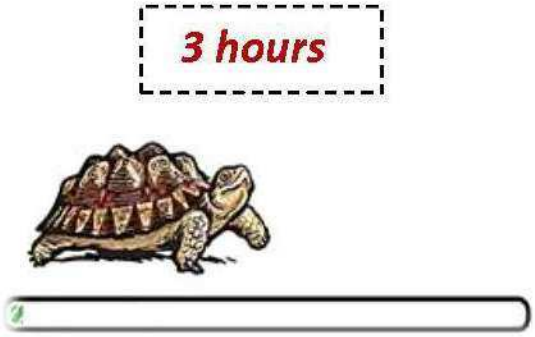
*The rocket has the **highest speed***

*because it covers the **longest distance** In same time.*

② Relation between speed & time
(At same distance)

- *Cheetah & turtle covers the same distance (50 meters) but in different time.*





Cheetah has the ***highest speed***

because it takes ***shorter time*** *to covers the same distance.*

Speed of moving objects depend on

❶ *The distance covered by the object.*

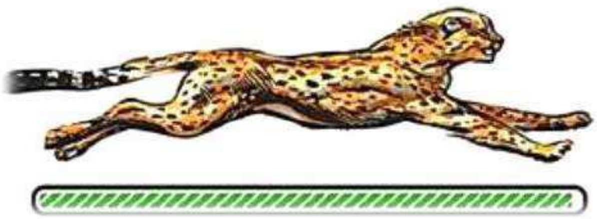
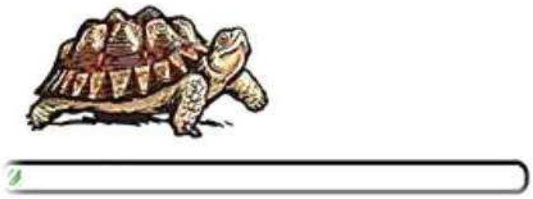
❷ *The time taken to cover this distance.*

Lesson ② Basics of speed

Speed

It is the distance covered by a moving object within interval of time.

- *Speed it is a physical quantity that indicates how fast object moves.*

Object move fast has higher speed *(as cheetah).* 	*Object move slow has low speed* *(as turtle).* 

1. The object that covers a longer distance in shorter time has high speed
2. The object that covers a shorter distance in longer time has low speed.

How to measure speed

1. *The distance measured by **kilometer** **or** **meter**.*

2. *The time measured by **hour** **or** **seconds**.*

3. *Speed measured by **divided distance** by the **time**.*

$$\text{Speed} = \frac{distance}{time} \xrightarrow{\text{Measuring unit}} \boxed{Km/h} \quad \boxed{m/sec}$$

The motion direction of object doesn't affect speed.

Problems

Problem no 1:

Calculate the speed of runner who run 240 m in 60 second?.

Distance = 240 meter   *time = 60 sec*

$$speed = \frac{distance}{time} = \frac{240}{60} = 4\ \ m/sec$$

__Problem no 2:__

Calculate the speed of a car that covers 300 km in one hour?.

Distance = 300 kilometer   time = 1 hour

$$speed = \frac{distance}{time} = \frac{300}{1} = 300\ \ km/h$$

__Problem no 3:__

If kenzy rides a bike and covers 150 m in 15 seconds to reach supermarket , Calculate the speed of the bike?.

Distance = ……… meter   time = ……… sec

$$speed = \frac{distance}{time} = \frac{\dots\dots}{\dots\dots} = \cdots\ \ m/sec$$

__Problem no 4:__

In a race, adam rides a bike and covers 500 m in 20 seconds Calculate the speed of the bike?.

Distance = ……… meter   time = ……… sec

$$speed = \frac{distance}{time} = \frac{\dots\dots}{\dots\dots} = \cdots\ \ m/sec$$

Problem no 5:

From the opposite figure , which car is faster ?.

Blue car Moves 10 meters in 2 seconds

Red car Moves 20 meters in 4 seconds

Solution

Distance = 10 m

time = 2 sec

$$speed = \frac{distance}{time} = \frac{10}{2} = 5\ m/sec$$

Distance = 20 m

time = 4 sec

$$speed = \frac{distance}{time} = \frac{20}{4} = 5\ m/sec$$

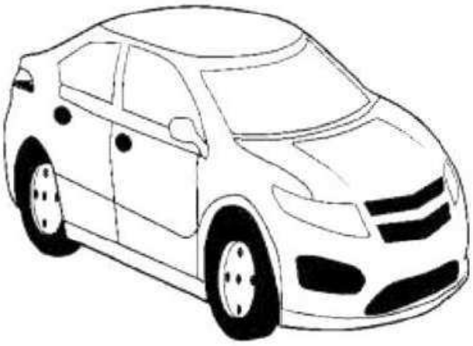
Two cars have the same speed .

Problem no 6:

From the opposite figure , which car is faster ?.

Gray car moves 50 meters in 2 seconds

White car Moves 60 meters in 2 seconds



Solution

Distance = ... m

time = ... sec

$$speed = \frac{distance}{time} = \frac{......}{......} = \cdots \quad m/sec$$

Distance = ... m

time = ... sec

$$speed = \frac{distance}{time} = \frac{......}{......} = \cdots \quad m/sec$$

Study hard

Lesson 3 Can you explain

When fast truck hit a slow car

- *Energy transfer from the truck to the car causing its damage.*

Fast objects

Or

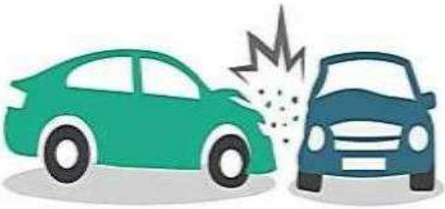
Heavy objects

Cause damage more than

Slow objects

Or

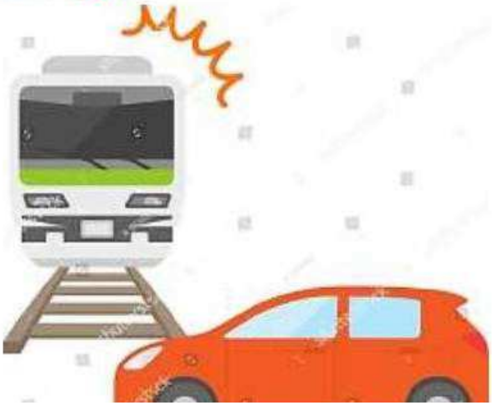
Light objects



When a train collide a car:

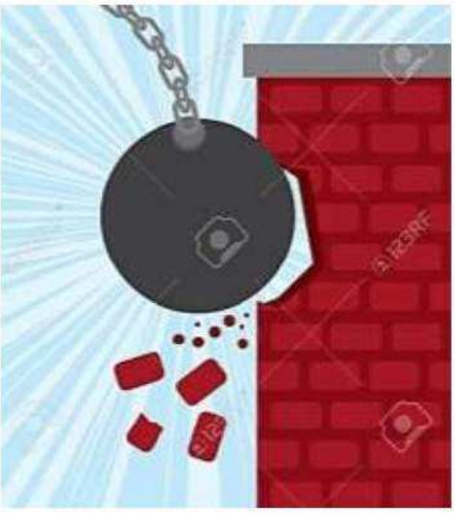
The train **(Heavy object has more energy)**

causes more damage to the car **(light object has low energy).**

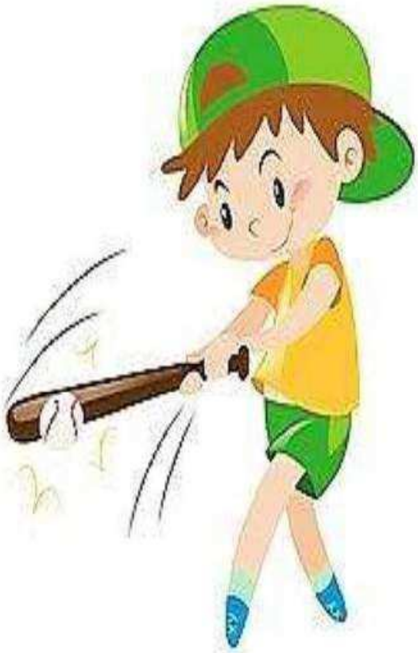


Examples for collision

① Wrecking ball

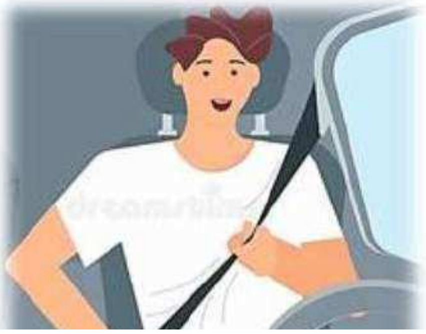
• It is a heavy steel ball swing on a cable. • It is used by construction workers to knock down parts of buildings.	

② Cricket game

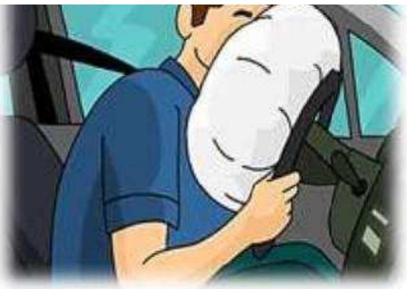
• The player uses a bat to hit the ball. • Energy transfer from bat to the ball. • When the bat hit the ball the speed of the ball increase in different direction.	

Safety equipment during collision

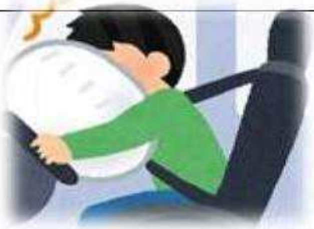
① Car seat-belt



They are used in cars to keep the driver body from moving forward during collision.



② Air bag

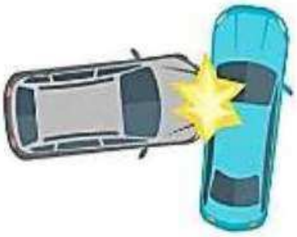
Structure	*It made of thin nylon material folded into steering wheel.*
Idea	***During collision:*** *Air bag inflated automatically.*  ***After collision:*** *Air bag deflates fast, so driver can get out of the car.*
Importance	*It slows the speed of driver when his body moves forward.* *It absorbs the energy of the car during collision.*

Lesson 4 Energy & collision

Collision

It is the moment of crashing of two objects together.

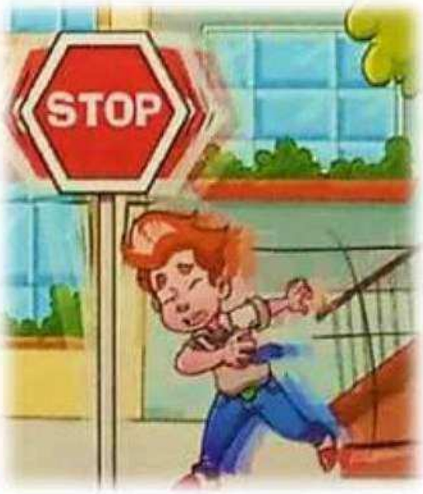
When two cars collide



- *Energy transfer occurs.*
- *Change of energy occurs.*

Example: when a boy running fast and hit traffic sign

- *The boy stop moving forward and he may bounce off & get injured.*



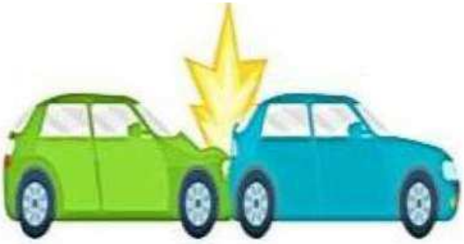
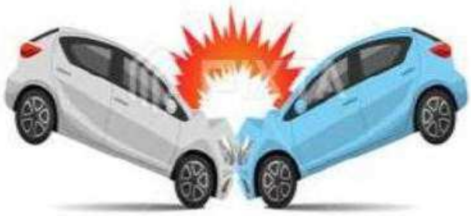
- *Kinetic energy transfer from the boy to traffic sign*

  So traffic sign may vibrate (wobble).

- *A part of kinetic energy change to sound and heat during collision.*

*The force exerted in accident depends on the **speed** & **direction** of both cars.*

1. Direction of two cars

Two cars move in same direction	**Two cars move in opposite direction**
Damage will be less serve.	*Damage will be more serve.*
	

2. Speed of two cars

Fast moving objects	**Slow moving objects**
They have more energy.	*They less more energy.*
When it hit another object, it exert more force.	*When it hit another object, it exert less force.*
This force cause big damage cannot be repaired.	*This force cause small damage cannot be repaired.*

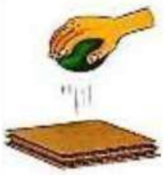
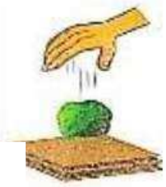
Lesson 5 Speed in collision

Relation between speed and kinetic energy

By increasing the force on an object, *object's speed **increase** ,Its kinetic energy **increase** (direct relation)* and damage will happen to the object.

Fast objects $\xrightarrow{have}$ *high kinetic energy* $\xrightarrow{causes}$ *more damage*

Slow objects $\xrightarrow{have}$ *low kinetic energy* $\xrightarrow{causes}$ *Less damage*

If the clay ball fall 	*The shape of the ball change slightly*
If the clay ball thrown lightly 	*The shape of the ball change more*
If the clay ball thrown strongly	*The shape of the ball change much more*

Relation between mass and kinetic energy

As object's mass increases Its kinetic energy increases (direct relation)

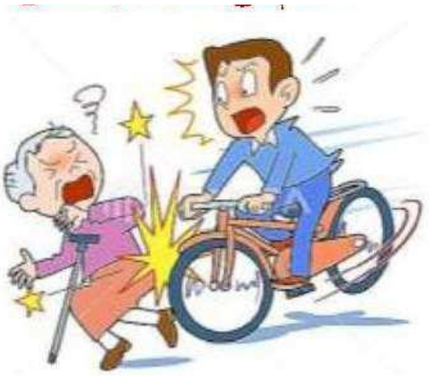
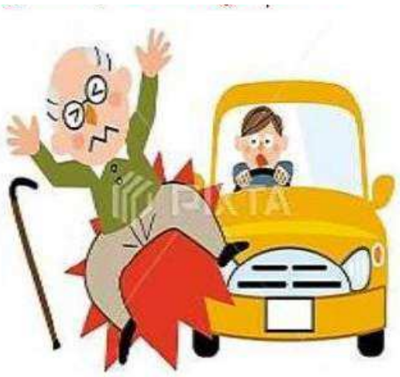
Heavy objects $\xrightarrow{\text{have}}$ high kinetic energy $\xrightarrow{\text{causes}}$ more damage

Light objects $\xrightarrow{\text{have}}$ low kinetic energy $\xrightarrow{\text{causes}}$ Less damage

The truck has big mass, big engine, high kinetic energy, consumes more fuel, causes more damage during collision.

The car has small mass, small engine low kinetic energy, consumes low fuel, cause less damage during collision

Effect of mass on collision

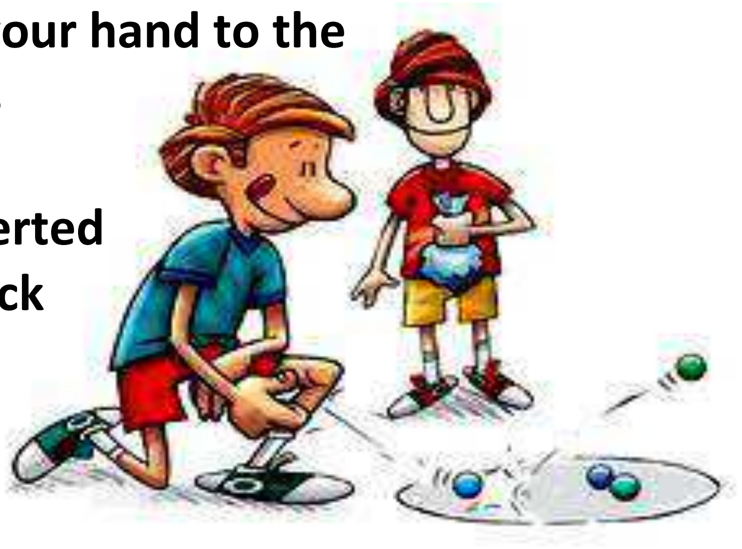
If a ***bike*** *move with speed* *50 km/hr hit a person*	*if a* ***Car*** *move with speed* *50 km/hr hit a person*
	
He may injure but he will survive.	*The life of person may be endangered.*

✸Heavy objects have high kinetic energy causing more damage.

✸Low objects have low kinetic energy causing less damage.

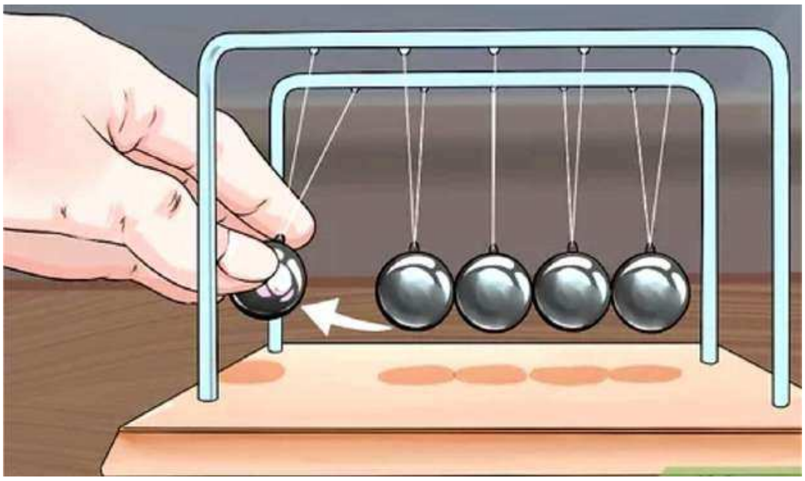
How can you play a game with marble :

Kinetic energy is transferred from your hand to the 1st marble then to the 2nd one and s



Some of the kinetic energy is converted into sound energy, so we hear a click sound during collision.

Energy transformation in Newton's Cradle :



When the ball is raised up:

The ball stores potential energy.

When the ball is left to move:

Potential energy decreases gradually and it is converted into kinetic energy.

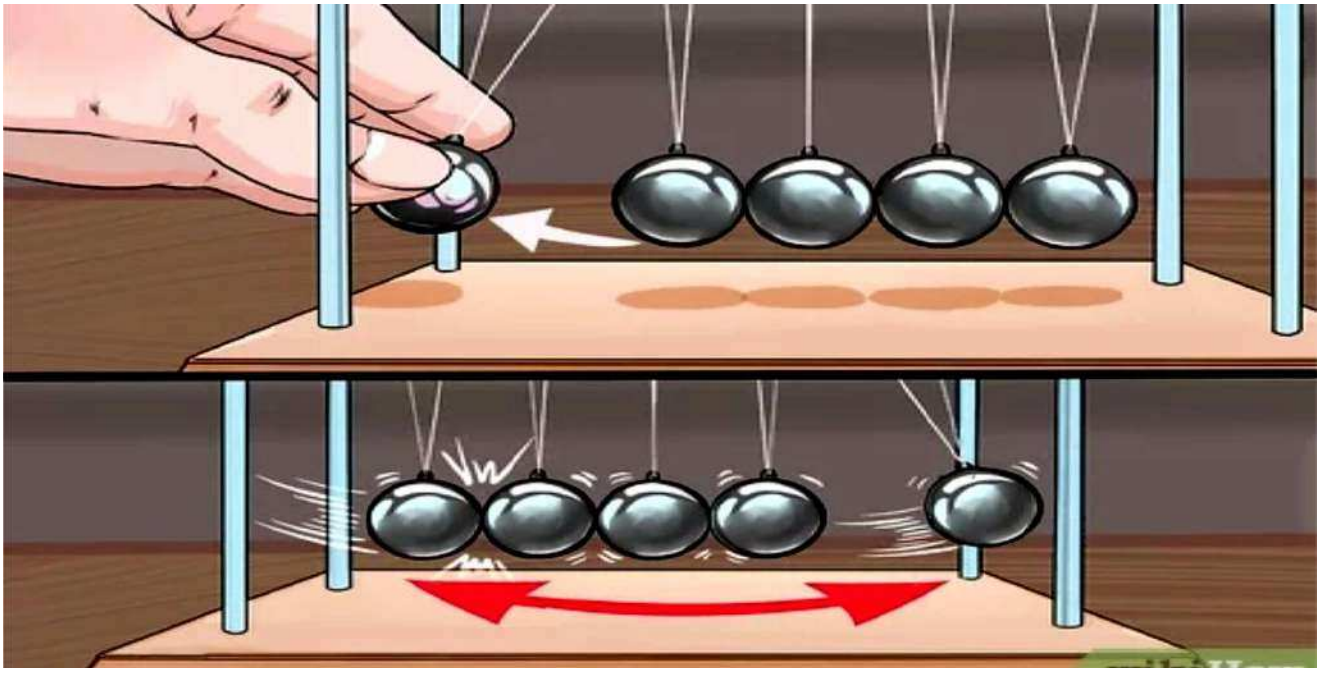
When the ball hits the 1st ball next to it :

Kinetic energy transfers to the 1st ball, then to the rest of the balls.

Some of the kinetic energy is converted into:

1-Sound energy (due to the collision between the balls).

2- Thermal (heat) energy (due to the friction between strings and other parts of cradle and between the air and the balls during their motion.



In Newton's Cradle :

The distance moved by the moving balls on the right side. = The distance moved by the moving balls on the left side.

The amount of energy before collision. = The amount of energy after collision.

The number of moving balls on the right side. = The number of moving balls on the left side.

Note: Energy is transferred and converted into other forms, but it can't be destroyed.

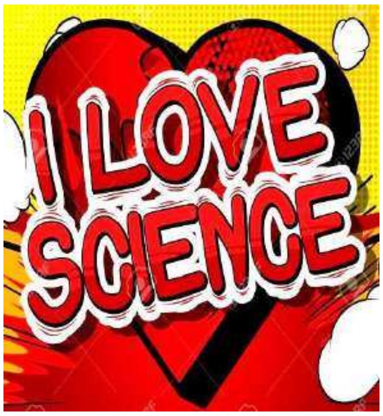
Kinetic energy travels in two opposite directions among moving balls.

GOOD
LUCK!
dreamstime

Geel 2000 Language Schools

Science Department

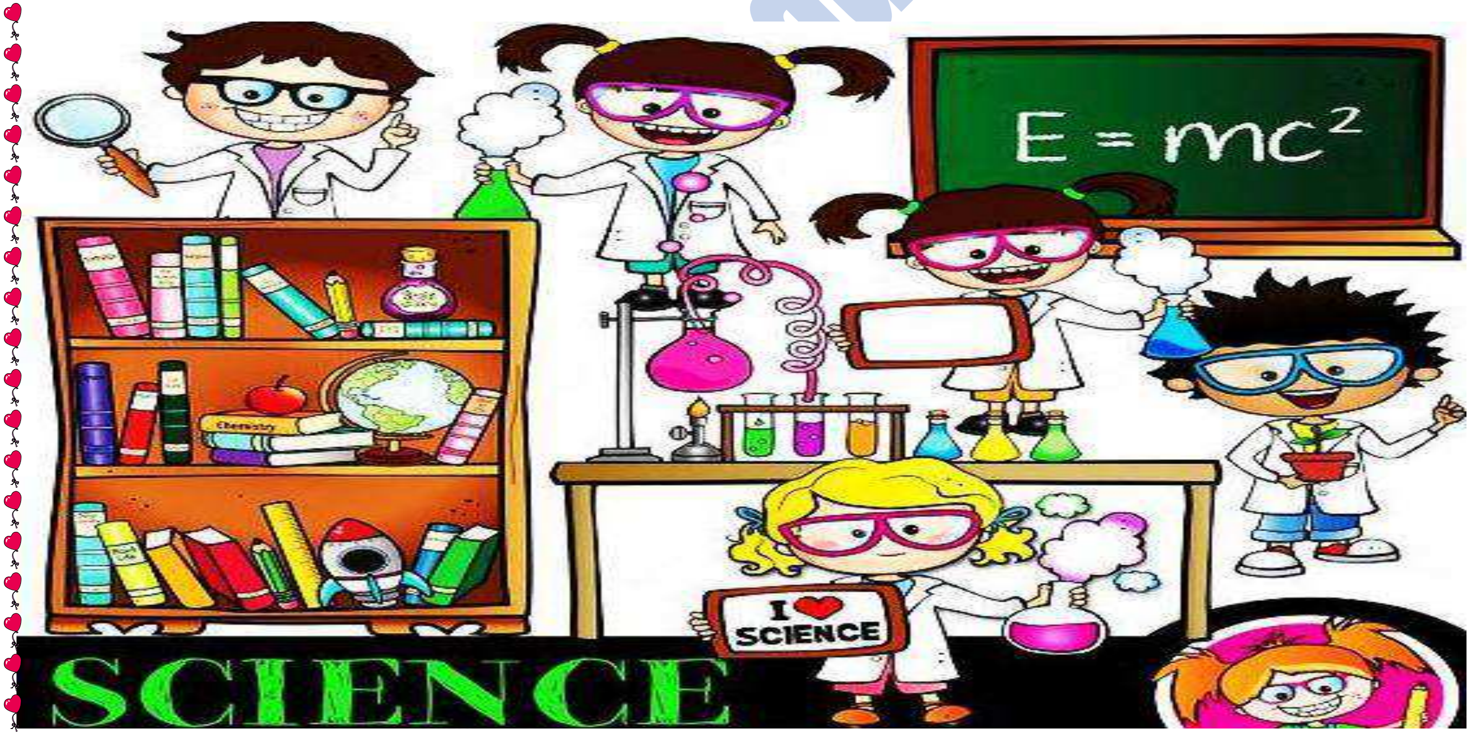
Worksheets with models answers


I LOVE SCIENCE

Primary (4)

First term

(2025 – 2026)


E = mc²
Chemistry
I ♥ SCIENCE
SCIENCE

Name: ....

Class: ....

Worksheet (1)

1- Classify the following animals according to the environment where they live.

Camel
Fennec Fox
Polar Bear
Octopus
Desert Lizard
Bull Shark
Arctic Fox
Penguin

Cold Polar Regions	Hot Deserts	Oceans

2- The characteristic by which living organisms can survive in the environment is called ______________________________.

3- ____________________________ is an example of adaptation by which animals hide from their predators or prays by blending in with the surrounding environment.

4- How do Fennec Foxes adapt to living in the desert? (Write 2 things)

1. ____

2. ____

5-Give Reason

a) Palm trees are covered with a waxy layer.

____

b) Penguins have a thick layer of fat.

____

c) Penguins feet don't freeze.

____

6-Complete this table

Animal	Habitat	Adaptation to survival
Penguin	Antarctica	Its body is covered with a thick layer of fat and thick feathers.
Polar bear	Arctic	1 It has thick fur to protect it from the cold 2 …………………………………………………
Brown bear and dark bear	………………………………………	It has dark fur that provides camouflage to help it hide among the trees as it hunts so it cannot be seen by its prey.
Caracal and fennec fox	Deserts	1- It has sandy-coloured fur. 2 ………………………………………………… 3 …………………………………………………
Lizards	Some lizards live in the desert and some live in other ecosystems among rocks or in gardens.	…………………………………………………

7- Choose:

1- Adaptation helps living organisms in all the following characters except…

(a) Surviving (b) hiding (c) death

2- If a desert lizard is transferred into a cool environment, it will stop………

(a) Looking for water to drink (b) breathing

(c) Looking for shade area (d) eating

3- When chameleon touches a blue flower, it blend with this color which A type of …………….

(a) Sleeping (b) breathing (c) camouflage

4- The behavioral adaptation that helps the animals protect itself from enemies…………….

(a) Blend in (b) extinction (c) immigration

5- ………………. are panting to lower its body temperature.

(a)Whales (b) lions (c) foxes

6- Animals that live in a hot environment have …………….ears to cool their bodies.

(a) small (b) short (c) long.

8-What happens when……?

One of the organs of the digestive system of human is absent.

……………………………………………………………………………

9- Some dogs live in a cold environment, while others live in a hot environment, in your opinion, which one has a thick fur? And why?

Worksheet (2)

Questions: A)-Complete this table.

Animal	Structural adaptation	Behavioral adaptation
Fennec Fox **Habitat** ……………	It has…………………………………………… ……………………………………………fur. 2-It has……………………………………to help it cool down.	1-It pants like dogs. 2-…………………………………………… ……………………………………………………
Arctic Fox **Habitat** ……………	1- It has thick fur. 2- …………………………………………… …………………………………………… 3-…………………………………………… ……………………………………………	1-…………………………………………… …………………………………………… 2-…………………………………………… ……………………………………………
Bull Shark **Habitat:** …………… & ……………	1-…………………………………………… …………………………………………… 2 …………………………………………… …………………………………………… 3-…………………………………………… ……………………………………………	1- …………………………………………… …………………………………………… 2 …………………………………………… ……………………………………………
Chameleon	1-It has ……………………………………… to help it blend in the environment. 2-It has ……………………………………… ……………………………to hunts insects. 3- It has ……………………………………… …………………………………….to hold tightly in branches of trees.	1- It puffs up its body with air 2- …………………………………………… 3- ……………………………………………

Worksheet (3)

1 Classify the following living organisms according to their habitat into organisms that live in deserts and organisms that live in forest in the table below:

(Starred agama lizard - Panther Chameleon - Fennec Fox - Kapok Tree - Palm tree- Barbary fig plant)

Acacia tree	**Kapok tree**
....	....
....	....
....	....

2 Compare between:

Points of comparison	**Acacia tree**	**Kapok tree**
1-Type of roots:	....	....
2-Shape of leaves:	....	....

Points of comparison	**Acacia tree**	**Pine tree**	**Water lily**
1-Habitat:	....	....	....
2-Shape of leaves:	....	....	....

2- Choose:

1. **The roots of palm trees help them to ……….**

(a) Stand strong against the wind (b) reach underground water

(c) Fix the tree in the soil (d) all are correct

2. **The cactus plant has spines that protect it from being eaten by desert animals, and this is considered a form of ……………**

(a) Behavioral adaptation (b) structural adaptation

3. **Mangroves tree grow in………………**

(a) Fresh water (b) salt water

4. **Barbary fig keeps animals away like acacia trees by its ………..**

(a) Smell (b) sharp spines (c) poison

5. **Umbrella-shaped tree are ………..**

(a) Mangrove tree and acacia tree (b) Mangrove tree and kapok tree

(c) Acacia tree and kapok tree.

6. **Acacia tree trunk and camel hump……….**

(a) Both store water (b) both store fat

(c) The first stores water, the second stores fat.

3- What happens if ……?

A plant is taken from its original environment and placed in another different environment.

……………………………………………………………………………..

Worksheet (4)

Questions on the digestive system:

A) Write the correct scientific term.

Teeth	Esophagus	Stomach	Saliva	Small intestine	Tongue	Large intestine

1. It mixes food with acid and digestive juices. ______________________

2. It changes starch into sugar. ______________________

3. It absorbs water from the undigested materials. ______________________

4. It completes the digestion of different types of food. ______________________

5. They break down and crush food during chewing. ______________________

6. It mixes food with saliva. ______________________

7. It moves the food down into the stomach. ______________________

✸B- What happens if:

One of the organs of the digestive system is absent.

………..

C) Choose from column (B) what suits in column (A)

A	B
Esophagus	a. absorbs water from the undigested food to make solid waste.
Small intestine	b. mixes food with acid and digestive juices.
Large intestine	c. the digestion begins in.
Stomach	d. food gets completely digested.
Mouth	e. is a muscular tube that moves food down to the stomach

1 .... 2 .... 3 .... 4 .... 5 ....

Worksheet (5)

Put (√) in front of the name of the system to which each of the following organs belongs:

The organ	**The system**	
	Digestive	**Respiratory**
1- Trachea		
2- Anus		
3- Stomach		
4- Lungs		
5- Small intestine		
6- Esophagus		
7- Diaphragm		
8- Nose		
9- Large intestine		
10- Liver		
11- Pancreas		

Write the scientific term of each of the following:

1. The organ where saliva moistens the food. [……………………………………]
2. Liquid substance in your mouth that moistens the bite of food and begins to break it down. [……………………………………]
3. A process through which the body gets oxygen from the air and expels out carbon dioxide. [……………………………………]
4. The organ which receives the food from esophagus. [……………………………………]

Questions

1. Compare between:

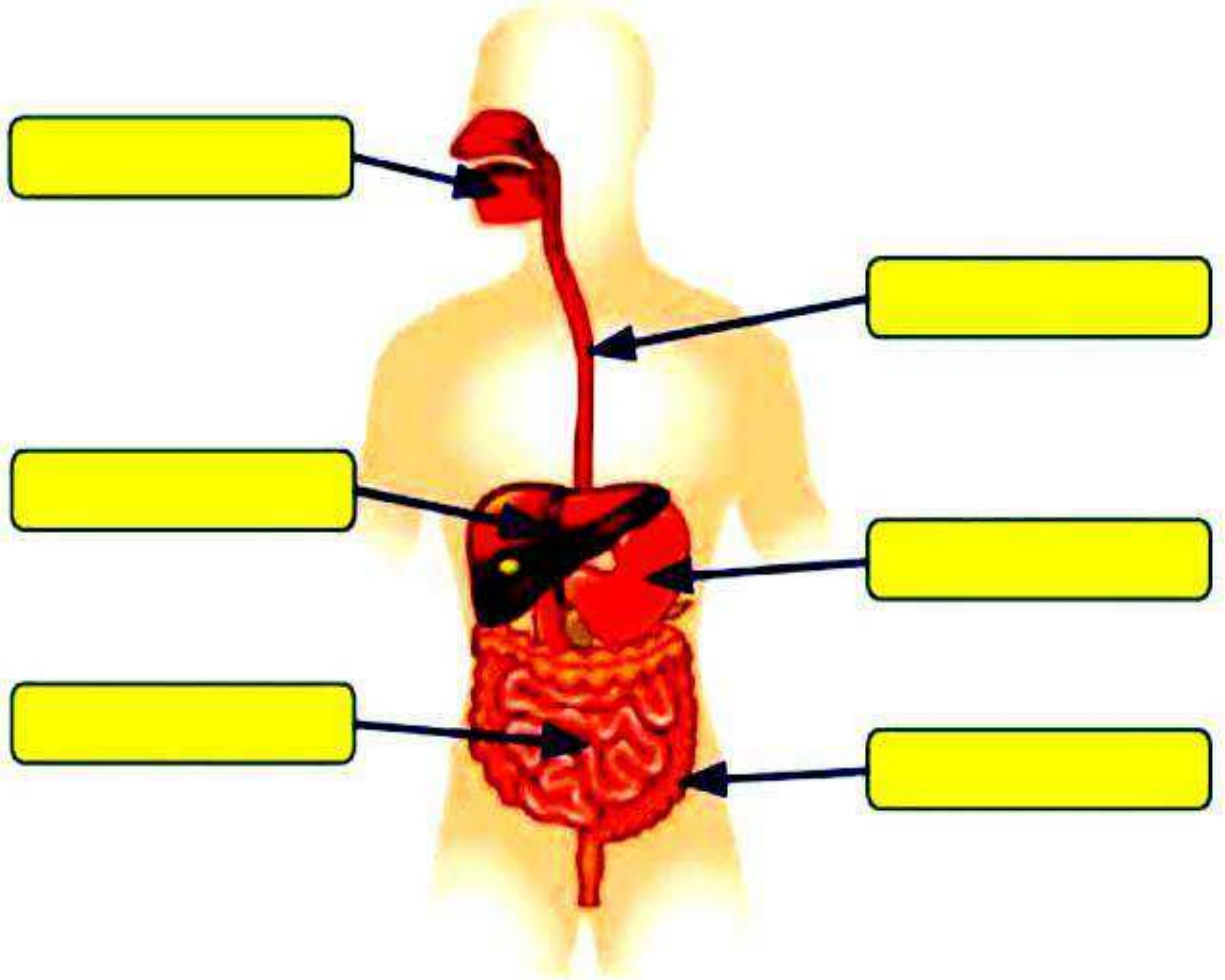
Points of comparison	Inhalation	Exhalation
1.Diaphram movement:	....	....
2.Size of chest cavity:	....	....
3.The air is rich in:	.... gas	.... gas

3. Match:

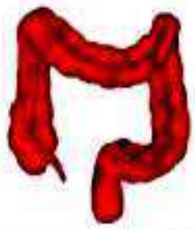
(A)	(B)
1. Trachea	a. is a large muscle at the base of the ribs that help process of exhaling and inhaling.
2. Blood	b. are like balloons and they fill up with air.
3. Diaphragm	c. carries the oxygen to all body organs.
4. Lungs	d. is a tube that air travels down into the lungs through.
	e. air enters the body through them.

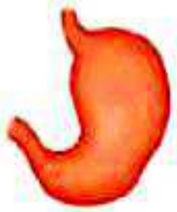
1 .... 2 .... 3 .... 4 ....

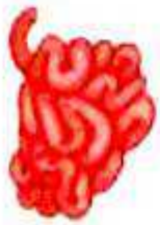
1. Label the organs of the digestive system. Choose the correct option.

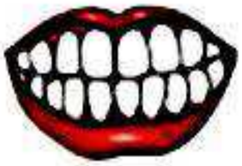


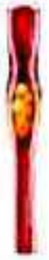
2. Write the names of these organs.



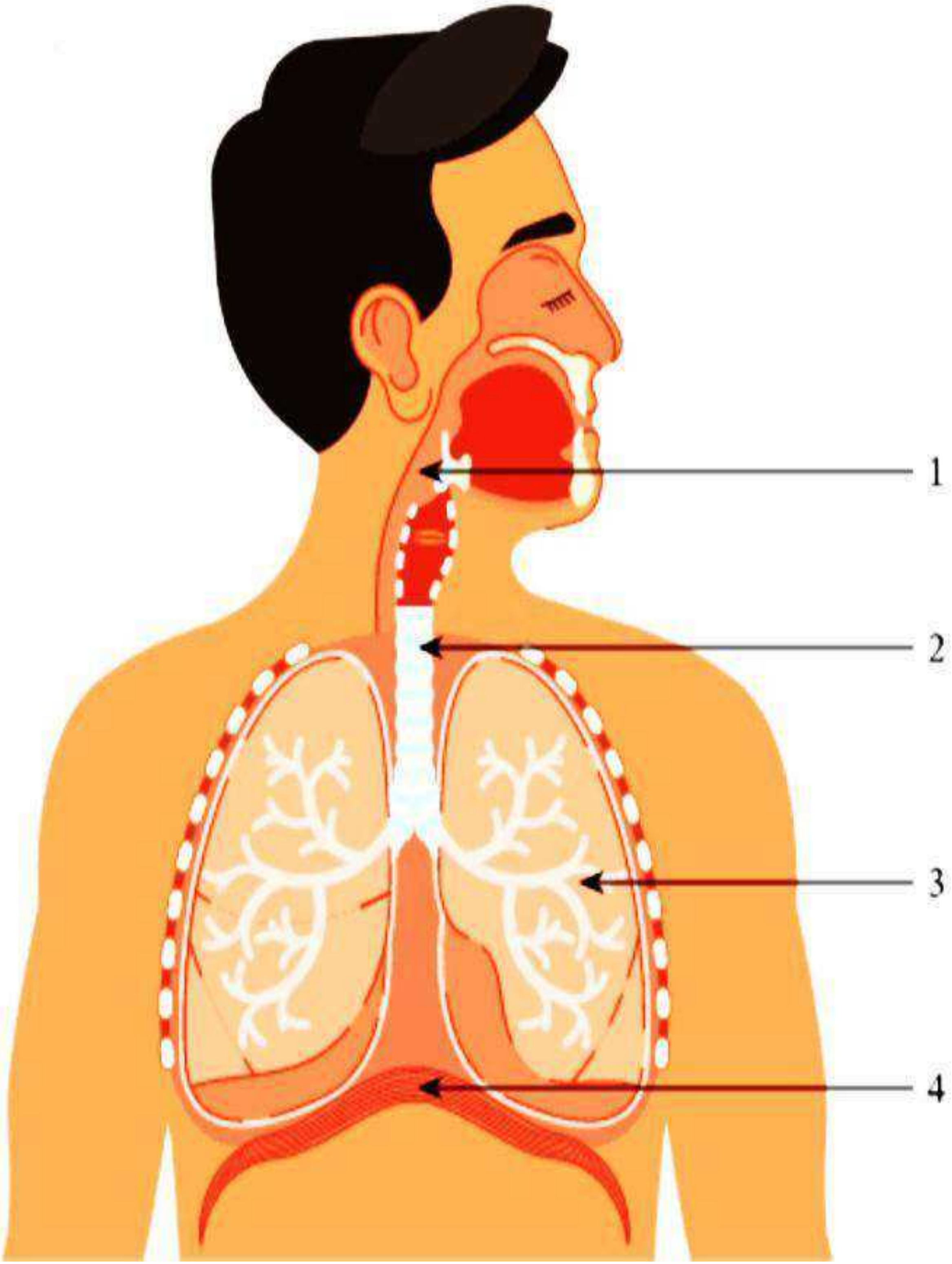








3- Label the organ of the respiratory system:



Worksheet (6)

1- Correct the underlined words:

1-Fish use gills to take carbon dioxide gas out of the water.

(…………………….)

2- Fins in fish are found under bony flaps that open and close.

(…………………….)

3- Air enters the mouth of a fish and then passed across the gills.

(…………………….)

4-Gills are unique behavioral adaptation that allow fish to breathe under water.

(…………………….)

2-Write the scientific term of each of the following:

1- A gas which the human and fish bodies must get rid during exhalation process. (…………………………………)

2- A kind of pollution that is caused due to throwing waste into Waterways. (………………………………)

3- What happens if…….?

1-The exhausts from cars and factories increase in big cities..

……………………………………………………………………………………………

2-The ecosystem of amphibians is containing clean air and water.

……………………………………………………………………………………………

3-Amphibians have gills only to breathe.

……………………………………………………………………………………………

Worksheet (7)

1-Match column (B) to column (A)

A- is active at night.	1.Light
B- it depends on the echo of the sound in locating the prey.	2.Owl
C- An animal with a bowl like face and strong senses of hearing and vision.	3.Nocturnal animal
D- It is the visible form of energy that is transmitted in the form of waves.	4.The bat
E- A structural adaptation in the eye that provides some animals with better vision at night.	5.Hearing
F- A sense that helps us hear birds.	6. mirror like membrane

A. ……. B…….. C…….. D……. E………. F……….

2-Write the scientific term of each of the following

1- The time taken by an organism's body to react to different stimuli around it.

(……………………)

2- A group of different animals that look for their preys at night (…………..…………)

3- Special type of nerves found in sensory organs and responsible for sending messages to the brain. (…………..…………)

4- An animal has long hind leg that enables it to jump long distance.

(…………..…………)

5- It is the main control center in the body.

(…………..…………)

3- Complete the following sentences:

1- The …………is the organ that sends information to the brain when you smell the scent of a nice perfume.

2- Echolocation is used by some animals such as…………. and ……………

3- Hopping of the Egyptian jerboa in zigzag patterns to stay away from the snakes attacking it is considered as a…………adaptation.

4- Owl can detect the places of their preys by using the super senses of ………….……….. and………………

4- Put (√) or (X):

1- A dolphin produces sound waves through its ears so it can locate its prey. (   )

2- It is difficult for a dolphin to be a prey of the owl. (   )

3- The owl uses the sense of touch to hunt its prey at night. (   )

4- A dog uses its sense of smell and eyesight to identify its owner. (   )

5- Nerves are an important part of the digestive system. (   )

Worksheet (8)

A- Cross the odd word:

1- Texting – sending an email – Echolocation – writing. (……………….)

2- Bats – Humpback whales – Dolphins – Ants. (………………………..)

B- Complete the following words between the brackets:

1- Ants depend on their sense of…………to communicate. (smell – sight)

2- Humpback whales communicate by their sense of……. (hearing – sight)

3- In a blind person's cane, the echo is turned into…..(flashlight – vibrations)

C- Write the scientific term:

1- A place where groups of ants perform different roles. (……………..)

2- Ants send a smelly message to alert the scout ants to search for food. (……………………….)

3- A special device that is used by a blind person to locate things nearby. (…………………………………….)

D- Give reason:

1- Humpback whales sing different songs.

………………………………………………………………………………

2- The solider ants use smells in their communication.

………………………………………………………………………………

D- What happens if:

1- The amount of food in ant's colony becomes low (decreases).

……………………………………………………………………

2- The high pitched sound that is produced by the blind person's cane hits an object.

Study hard

Worksheet (9)

A) Choose the correct answer:

1. Which of the following organs are working together for seeing different objects?

a) Nose and brain **b) Eyes and brain** **c) Tongue and brain**

2. All the following things are considered as a light source, except.........

a) eyes **b) fire** **c) the sun**

3. **Fishing cats depend on the reflection of…………………waves.**

a) Sound **b) light** **c) heat** **d) chemical**

4. The thing that makes the eyes of fishing cats glow at night, is ....

a) the main controlling center of its body.

b) the light that bounces off membrane on the back of their eyes.

5. The sun and the moon appear bright, because ....

a) the light is bounced off both of them **b) the light bounced off the moon and is emitted from sun**

6. Humans have .... eyes than nocturnal animals.

a) smaller **b) bigger** **c) stronger**

7. The light wave travel in air as ....

a) curved line **b) straight line** **c) circular line**

8. **Vision occurs due to the………………..of light.**

a) deflection **b) refraction** **c) reflection** **d) structural**

B- Give reason:

1- Although the moon is shiny, it is not a source of light.

……………………………………………………………………………………..

2- A fishing cat's eyes seem to glow in the dark.

………………………………………………………………………………………

D) Write the scientific term of each the following:

1. The organ that is affected by light and responsible for sight. [..................................]

2. A species of wild cats, that have eyes glow at night. [..................................]

3. The organ that is responsible for processing information received from eyes, to know and recognize the surroundings. [..................................]

4. A body that appears lighted in the sky at night, but it is not considered as a source of light.

. [..................................]

5. Objects, that emit their own light. [..................................]

6. The visible form of energy, that bounce off objects into our eyes. [..................................]

7. The organ of vision, which receives light that reflected from the surrounding object.

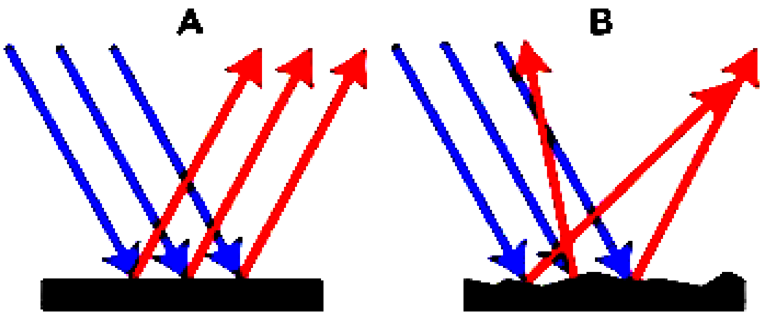
[..................................]

8.The life-saving structural adaptation that gives fishing cat excellent night vision.

[..................................]

9. Animals that can see at night. [..................................]

D) Look at the following figures, then answer the questions below:



1. Complete:

a. The surface in fig. (A) is ....

- Because ....

b. The surface in fig. (B) is ....

- Because ....

c. In two figures the falling and reflected rays show that light travels in .... Line.

B) Choose from (B) what suits it in (A):

(A)	(B)
1. Brain	a. through which sensory receptors of the eyes send message to the brain.
2. Pupil	b. through which the light rays are reflected, so eyes of nocturnal animals are glowing at night.
3. **Mirror**	c. through which the light wave enters the eyes.
4. Nerves	d. through which the collected information from eyes are processed.

1. ……………………   2. ………………   3. ……………………   4. ……………………

C) Choose from (B) what suits it in (A):

(A)	(B)
1. Fishing cat	**a. Can locate their preys in dark water.**
2. Owl	b. has excellent night vision and its eyes glow at night.
3. Bat	c. has poor night vision, so it depends on the sound that bounces off prey's body.
4. **Dolphins**	d. has extraordinary sight at night and bowl-shaped face.

1. ……………………   2. ………………   3. ……………………   4. ……………………

Worksheet (10)

A- Choose the correct answer:

1- Light travels in ……………….lines.

a- curved b- zigzag c- straight d- opposite

2- ………..is an example of light reflecting material.

a- wood b- mirrors c- plastic d- papers

3- All the following materials are opaque, except…………

a- wood b- the human body c- iron d- water

4- …………..allows light to pass through it.

a- the moon b- rock c- glass d- wood

5- When light falls on a dark surface,………………….

a- the surface absorbs the light. b- nothing happens

c- the light refracted. d- the light passes through it.

6- All the following are rough surfaces, except……………….

a- mirror b- clothes c- wood d- paper

B- Complete from the following:

1- When light falls on an opaque object, a………is formed.

(rainbow – shadow)

2- You can see a ball found inside a…………box. (glass – wooden)

3- …………is a transparent liquid material. (air – water)

4- A rough surface………….the light rays falling on it. (scatters – collects)

5- The mirror like membrane in the cat's eyes is a…………surface.

(rough – smooth)

6- Shadow is formed when light falls on a……… (glass – tree)

C- Write the scientific term:

1- The bouncing of light rays when they fall on a reflecting surface.

(……………………………………)

2- Materials that don't allow light to pass through. (………………….)

3-They are surfaces that reflect the light rays in one direction. (……………..)

4- A dark area that is formed when light falls on an opaque object. (………..)

D- Give reason for:

1- Water is a transparent material.

…………………………………………………………………………………

2- You can see your image in a mirror.

………………………………………………………………………………..

E- What happens when:

1- Light rays fall on a paper.

…………………………………………………………………………………

2- Light rays fall on opaque object.

…………………………………………………………………………………

Worksheet (11)

A- Complete from the following:

1- Fireflies light up due to a……………reaction in their bodies.

(physical – chemical)

2- The ability of fireflies to light up is a……………adaptation.

(structural – behavioral)

3- Fireflies depend on their sense of……………to communicate together.

(hearing –_sight)

B- Write the scientific term:

1- It is a kind of beetles that light up their wings. (……………..……….)

2- It is a living organism that communicates by cell phones. (……………….)

1- Firefly 2- Human

C- Cross the odd word:

1- Traffic lights – reading – lighthouses - echolocation. (…………………..….)

D- Give reason for:

1- Fireflies light up their wings.

……………………………………………………………………………

E- What happens when:

1- There is another group of fireflies flashing nearby ?

……………………………………………………………………………

Worksheet (12)

A- Complete from the following:

1- ……….is a code in the form of sound that humans can communicate.

(writing – language)

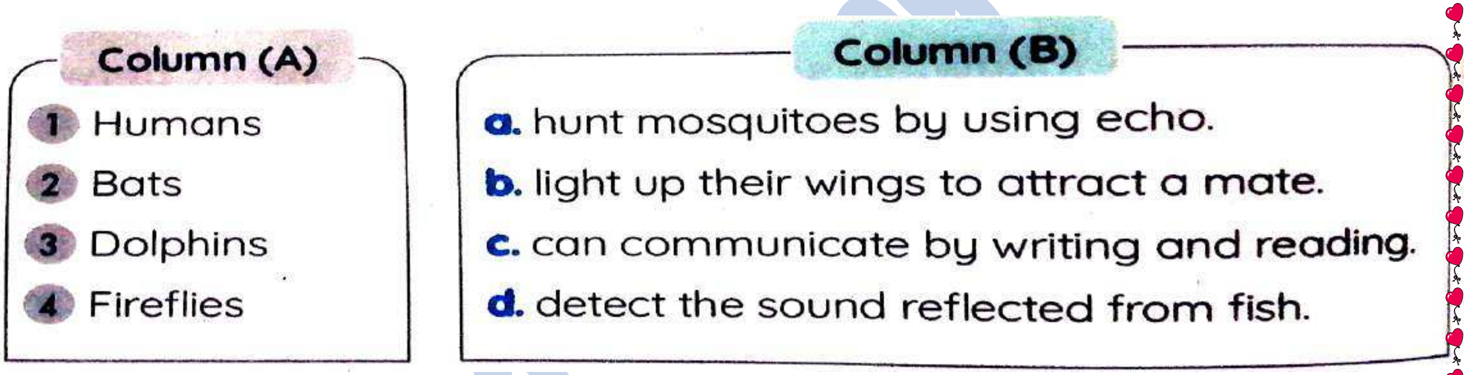
2- The tones of musical instruments can be detected by…………… .

(eyes – ears)

3- Different languages are considered………………...

(codes – lights)

B- Choose from column (A) what suits it in column (B):



Column (A)	Column (B)
1 Humans	a. hunt mosquitoes by using echo.
2 Bats	b. light up their wings to attract a mate.
3 Dolphins	c. can communicate by writing and reading.
4 Fireflies	d. detect the sound reflected from fish.

1- (………)　2- (……….)　3- (….….…)　4- (………)

1- c　2- a　3- d　4- b

C- Give reason for:

1- The light of lighthouses is very important for sailors.

………………………………………………………………………………

D- What happens if:

1- You see the red traffic light.

………………………………………………………………………………

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Worksheet (13)

(A) Write the scientific term of each of the following:

1- A force that you make to change the direction of an object towards you.
(……………………….)

2- A force that you make to change the direction of an object away from you.
(……………………….)

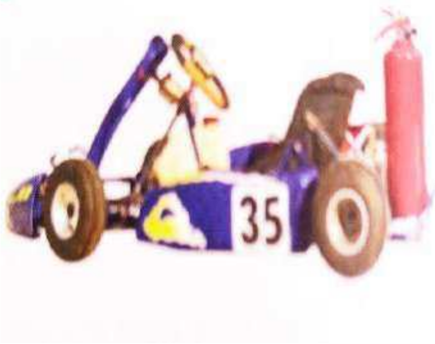
3- It is a push or pull that is applied to an object causes it to change its position.
(……………………….)

4- It is a force that is exerted when objects rub against each other.

(……………………….)

(B) Look at the opposite figure, then answer the following question:

1-In the opposite figure what happens if we increase the number of fire extinguishers fixed on the cart.



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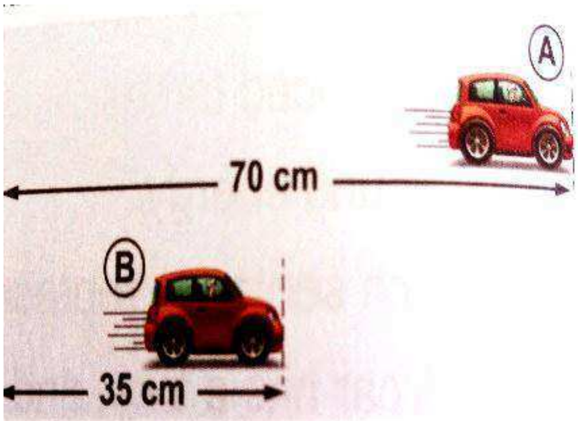
3- The following figure shows two similar toy cars, study the figure then answer the questions below:

Which of these two cars is affected by a greater force?

(Give a reason for your answer).



(c) Put (√) or (x):

1-Lifting a book upward needs more energy than pushing a truck. ( )

2-You need energy to push a car forward or backward. ( )

3-Using a remote control of television needs a pushing force that acts on its buttons. ( )

4-When a car crashes into a wall, it will not stop. ( )

(D) Give a reason for the following:

1-The shockwave truck is faster than the normal truck.

2-Anybody moves on the ground is usually affected by a force opposes its direction of movement.

3-If a ball moves on the ground, its speed decreases till it stops.

E- Complete the following sentences using the words below:

(Friction – balanced – opposes – unbalanced)

1-Any object moves from its place when the forces acting on it is………………

2-The force that slows down or stops motion is called………………

3-Friction is a force that ……………… motion.

4-When a book is lying on a table without moving, the forces acting on it are …………….

F-What happens if …..?

A jet engine is placed in a normal truck instead of its normal engine.

……………………………………………………………

Worksheet (14)

(A) Complete the following from the words between the brackets:

1- To exert a force on an object……….is needed.

(work – energy)

2- To stop or start moving an object,……..is required.

(sound – force)

(B) Write the scientific term:

1-The energy that the object gains due to its motion.

(……………………………………)

2-The ability to do work or cause change.

(……………………………………)

(C) Correct the underlined words:

1-The ability to do force or cause change is known as energy. (………………………………………)

2-We can't see all forms of energy, except thermal energy.

(………………………………………)

Worksheet (15)

A-Complete from the words between brackets :

1. On the top of the ramp, ………….energy is zero. (potential –kinetic)

2. On the top of the ramp, …………..energy is maximum.

(potential – kinetic)

3- On kicking a ball………energy transfers from your foot to the ball.

(potential – kinetic)

B-Write the scientific term of each of the following:

1- The form of energy that the object has due its movement.

(…………………………..)

2- The energy that is used to operate all electric devices.

(……………………….)

3- It is the stored potential energy in a compressed spring.

(………………………)

4- The energy that is stored in both the human food and car fuel.

(………………………)

C- Correct the underlined words:

1- When an object moves down, it has more active form of energy known as potential energy. (………………………)

2- Kinetic energy is used in cooking food. (……..………………..)

3-A car battery stores a form of kinetic energy known as chemical energy. (………………………)

D- Choose the correct answer:

1-When an object moves down a ramp, its stored energy…………

a. Increases.
b. Doesn’t change.
c. Changes to a less active form of energy.
d. Changes to a more active form of energy.

2- All the following energies cannot be seen, except………………

a. Thermal energy.
b. Electrical energy.
c. Light energy
d. Sound energy.

3- All the following examples store chemical energy, except…………..

a. Food.
b. Natural gas.
c. A battery.
d. A compressed spring.

4- When the ice-skater jumps high, the force affecting the skater must be…

a. Balanced.
b. Unbalanced.
c. Created.
d. Destroyed.

E-What happens if ……?

1- A roller coaster moves from up to down. (According to its energy).

……………………………………………………………………………

2- A roller coaster stops. (According to its energy).

……………………………………………………………………

Worksheet 16)

A- Choose from column (B) what suits it in column (A):

(A)	(B)
1. Chemical energy	a. is changed into kinetic energy in the car engine.
2. Kinetic energy	b. is decreased by increasing the speed.
3. Potential energy	C. is increased by increasing the speed.
	d. is the produced energy from a battery .

1-………….. 2-……………. 3-…………….

B- Choose the correct answer:

1- The source of energy in a robot is ……………

a. Electrical energy .
b. Solar energy.
c. Thermal energy.
d. Chemical energy.

2- Chemical energy can be stored in …………

a. Food only .
b. Televisions and food .
c. Batteries only .
d. a & c .

3- in a …………., chemical energy is converted into light energy .

a. gas oven.
b. clock.
c. flash light.
d. normal car .

Complete from the words between brackets:

1-When you clap your hands, kinetic energy is converted into

……………….   (light – sound)

2-what kind of energy is stored inside the battery?

(chemical energy – heat energy)

Best
wishes!

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Worksheet (17)

- **Choose the correct answer:**

1-When the objects collide with each other,………is transferred them.

a) time

b) distance

c) energy

d)nothing

2- A moving ……………. has no engine .

a. motorbike b. truck c. bike d. car

3-**Collisions usually produce ………….**

a) Solar energy. b) Sound energy.

c) gravitational potential energy. d) chemical potential energy.

4-Airbag is made of …………

a) carton.

b) nylon.

c) rubber.

d) cotton .

5-When a car stops suddenly, the passengers move …………

a) back ward .

b) upward.

c) forward.

d) downward.

6- When the cricket bat hits the ball, the ball direction ………
and the ball speed ………..

a) doesn't change – doesn't change .

b) doesn't change – changes .

c) changes – doesn't change.

d) Changes – changes.

- **Give reasons for:**

1- Seatbelts in cars are very important.

………….. ………………………………………………………………..

2- Airbags deflate after a collision.

………………………………………………………………………………..

3-The speed of the ball increases when the bat hits it hardly.

………………………………………………………………………………..

- **Put (✓) or (x) :**

1- Astatic truck has more kinetic energy than a moving car. ( )

2- During a crash between two cars , the potential energy transfers from the faster car to the slower one . ( )

3- After car collision , the air bags deflate as fast as they inflate . ( )

4- Seat belt enables the driver to see the road clearly. ( )

5- When a fast car hits a very big tree, the kinetic energy of the car transfers into the tree. ( )

- **Complete the following sentences:**

1. During a car crash , the …………… is inflated with a gas to provide a soft cushion.
2. Among safety equipment which are used during collision of cars ………. and …………. …
3. As a result of collision between the ball and the bat the direction of ball will ……………..

Worksheet (18)

- **Choose the correct answer:**

1-Which of the following relations can be used to calculate the speed of a moving object?
a-Speed = Distance – Time
b-Speed = Distance x Time.
c-Speed = Distance + Time.
d-Speed = Distance ÷ Time.

2-If a bicycle travels 30 meters in 5 seconds, so its speed equals……………..
a-6 km/hr.   b- 3 km/hr.   c- 7 km/sec.   d- 6 m/sec.

3-the result of dividing the distance traveled by time equals…………
a-the energy   b- the force   c- the mass   d-the speed

4-kinetic energy isn't affected by the object's…………
a-mass   b- speed   c-color   d-weight

Complete the following sentences:

1. To calculate the speed of a body that moves down a ramp, we need to know the ………… of the ramp and the ………… taken to reach the end point of the end point of this ramp.

- Problems:

1-Calculate the speed of a train that travels a distance equals 200 kilometers in 4 hour.

……………………………………………………………………………………

2- If your school is 3 kilometers away from your house and it took 1 hour to walk there, calculate your rate of speed.

…………………………………………………………………………………

3- If a bus traveled 600 kilometers in 6 hours, calculate the average of the bus speed.

…………………………………………………………………………………

- **Complete the following sentences:**

1- When two cars collide with each other, some of transferred energy may be in the form of heat,…………. and ………….

2- A car covers 80 meters in 4 seconds, so it moves at a speed equals……….. m/sec

3- A car with speed =100km/hr., Its kinetic energy is …………. Than that of another car with speed =60 km/hr.

4- Speed is a ……………. quantity.

5- The speed of two objects is equal, if they cover the same …………. at the same……………

- **Choose the correct answer:**

1. What happens when a driver presses the brakes and stop suddenly? ……………….

a) The passenger moves back ward
b) The passenger moves forward
c) The passenger remains stable
d) No correct answer

2. How can we calculate speed ? …………

a) Time / Distance
b) Distance/ time
c) Mass / time
d) Distance/ mass

3. An object keeps moving with same speed when ……………..

a) Its kinetic energy decreases.
b) Its potential energy increases.

c) No another force stops it.
d) Another object collides with it.

4. When two cars moving in opposite directions collide, the ……….

a) Energy of the fast car is more and causes more damage
b) Energy of the fast car is small and causes less damage.
c) Energy of the low car is more and causes more damage
d) Energy of the small car is small and causes less damage

5. If two objects collide together, the energy before collision is …………. The energy after collision.

a) equals
b) more than
c) less than
d) greater than

Write the scientific term for each of the following:

1. The process in which two objects or more crash into each other and includes on energy. (………………….)
2. One of the factors that affects the kinetic energy. (………………….)
3. It is a measurement of how fast something is moving. (…………………..)

- **Put (✓) or (x):**

1. Speed is measuring how or hot or cold something is. (   )
2. Drivers should drives as fast as possible to avoid accident. (   )
3. If a car covered a distance of 10 m in a time of 2 second, so the speed of the car is 5m/sec. (   )

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4. Kilometer/hour is the only measuring unit of speed. ( )

5. A heavier object causes more damage than a lighter object. ( )

Worksheet (19)

- *Choose the correct answer:*

1-When a person is riding his bike at high speed and hits an empty litter box, which of the following is the expected effect after collision?

a-The box moves.

b-The speed of the bike increases.

c- The speed of the bike decreases .

d-A and C .

2-If a motorcycle hits an adult pedestrian in the street , it may cause ……

a-Slight injuries , due to the high- speed

b-Severe injuries, due to the low -speed

c-Severe injuries, due to the high – speed

d-No correct answer

3-Fast moving objects, ………………….

a-Produce great kinetic energy

b-Cause more damage during a collision

c- Consumes more fuel

d-All the previous answer

4-In newton's cradle , the balls stop , due to………..

a-The friction between the string and other moving parts

b-the kinetic energy is converted into sound energy.

c- Some energy is lost ,when the balls pass through the air

d-All the previous answer

5-In newton's cradle, kinetic energy is converted into …………….

a-Light energy
b-Thermal energy
c-Sound energy
d-B and C

6-During a collision, all the following happen, except ………………

a-energy transfer
b-energy changes
c-energy is destroyed
d-damage takes place

7-The kinetic energy of a vehicle increases when ……………….

a) Its speed decreases
b) Its Mass decreases
c) Its mass and speed increase
d) No correct answer

8-Which one is the fastest?

a) A kid runs 400 meters in 5 minutes.
b) A girl rides a bike and covers 400 meters in 2 minutes.
c) A kid walks 400 meters in 10 minutes.
d) A boy rides a car and covers 400 meters in 1 minute.

- **Put (✓) or (x) :**

1. **As the mass of an object increases, its kinetic energy increases ( )**
2. **When the angle of the ramp decreases, the speed decreases. ( )**
3. **During collisions of the Newton's cradle balls , the amount of kinetic energy remains as it is. ( )**
4. **As the speed increases, the amount of fuel used decreases. ( )**
5. **The mass of moving body affects its speed. ( )**

- **Complete the following sentences using the given words :**

(after – doesn't disappear – sound energy – before – air – mass – large)

1-The energy…………., but changes from one form to another

2-In newton's cradle, an amount of energy is lost in the form of …………… energy.

3-When a collision occurs, the energy……………….collision is equal to energy……………. collision.

4-When ……………. of an object increases , its kinetic energy increases.

5-Vehicles with……………. Mass cause great damage during collision.

6-In newton's cradle, the balls lose some energy in ………………….

- ***Complete the following sentences using the words between brackets :***

1. If a truck ‘s mass is 1 ton , it has …………………. Energy than a 2 – ton truck has. (More – less)
2. The relation between the speed of a moving object and its kinetic energy is a/an …….. ……….. relation. (Direct – inverse)
3. When the car fuel is completely runs out , the car’s …………………… becomes zero . (Mass – speed)
4. When we lift-up the first ball of the Newton’s cradle,…………. energy is stored. (Potential – kinetic)

Best wishes!

Model answers

Worksheet (1)

1-Classify:

- Cold polar regions (Arctic fox-polar bear- penguin).

- Hot deserts (camel fennec fox – desert lizard)

- Oceans (octopus-bull shark).

2- Adaptation. **3- Camouflage.**

4 - 1- it has a tan – colored coat. **2- It has extra – large ears.**

5-Give reason:

a- Beause waxy layer protects palm leaves from drying out.

b- To trap warm air against the skin to keep its body warm.

c- Due to the movement of blood in blood vessels through the penguin's feet.

6-Complete the table:

Polar bear: It has white fur to help it blend in with the snow.

Brown bear: Forests.

Caracal & fennec fox: It has extra-large ears.

It has a special shape of ears.

Lizards: they have colorful scales that make them hard to see among the rocks.

7- choose

1- Death.	**2- Looking for shade area**
3-Camouflage.	**4-Blend in.**
5- Foxes.	**6-Long.**

8-What happens if……?

The digestion will not complete.

9- The dogs which live in cold environment have thick fur to keep the body warm and adapt with the cold weather.

Worksheet (2)

Fennec fox

Habitat: hot deserts.

Structural: 1-Sandy colored fur/ 2-extra-large ears.

Behavioral: It lives in burrows.

Arctic fox

Habitat: Tundra

Structural: It has short ears and legs – It has a special shape of ears.

Behavioral: It lives in burrows - It eats different kinds of food.

Bull shark : Habitat: fresh water & salt water.

Structural: Its body is adapted to survive in fresh water.

It has a dark and white belly (countershading).

It has sharp teeth.

Behavioral: It can hunt in different places.

It hunts in the day as well as the night.

Chameleon

Habitat: Tropical rainforest.

Structural: It has brightly colored scales.

It has a very long sticky tongue.

It has v- shaped feet and a tail like a hand.

Behavioral: It open its mouth wide.

It changes the colors of its scales.

Worksheet (3)

Table 1

Acacia tree (fennec fox –palm tree- Barbary fig plant- starred agama lizard).

Kapok tree (panther chameleon).

Table 2

Acacia tree (taproot- tiny leaves).

Kapok tree (buttress roots – hand shaped leaves).

Table 3

Acacia tree (savannah forest – tiny leaves growing).

Pine tree (snow – needle leaves)

Water lily (wetland – wide leaves)

Choose:

1-(d) 2-(b) 3-(b) 4-(b) 5-(c) 6-(c)

What happens of ……?

This plant may die or may adapt the new environmental conditions to survive and grow in its new environment.

Worksheet (4)

A-Write the scientific term of each of the following:

1-Stomach **2- Saliva** **3-Large intestine**

4-small intestine **5-Teeth** **6-Tongue**

6- Esophagus

B-What happens if:

1- The digestive system could not do its function correctly.

C- **Choose**:

1-e **2-d** **3-a**

4-b **5-c**

Worksheet (5)

Table 1:

Digestive (anus - stomach - small intestine – esophagus – large intestine liver – pancreas)

Respiratory (trachea-lungs-diaphragm-nose)

Write the scientific term of each of the following:

1- Mouth.
2- Saliva.
3- Respiration process.
4- Stomach.

1- Compare between:

Inhalation:

Moves downward **increases** **oxygen gas**

Exhalation:

Moves upward **decreases** **carbon dioxide gas**

2- Match:

1-d 2-c 3-a 4-b

Label the organs of the Digestive system

Mouth – Esophagus – Liver – Stomach – Small intestine – large intestine

Write the name of these organs

Large intestine

Stomach

Small intestine

Mouth

Esophagus

Label the organs of the respiratory system

1-Throat **2-Trachea**

3-Lungs **4-Diaphragm**

Worksheet (6)

1-Correct the underlined words:

1- Oxygen.
2- Gills.
3- Water.
4- Structural.

2- Write the scientific term of each of the following:

1- Carbon dioxide gas.
2- Water pollution.

3-What happens if……..?

1- Air pollution occurs.
2- Amphibians will survive and their number increases.
3- They can live only underwater.

Worksheet (7)

Table (1)

A-3 B-4 C-2 D-1 E-6 F-5

2-Write the scientific term of each of the following:

1-Reaction time.

2- Nocturnal animals.

3-Sensory receptors. 4- Jerboa 5- Brain

3- Complete the following sentences:

1- Nose
2- Bat and dolphin
3- Behavioral
4- Eye sight and hearing.

4- Put (√) or (x):

1 (x) 2 (√) 3 (x) 4 (√) 5 (x)

Worksheet (8)

A-Cross the odd word:

1- Echolocation 2-Ants

B- Complete the following words between the brackets:

1- Smell 2- hearing 3- vibrations

C- Write the scientific term:

1- colony 2- Nurse ants 3- A blind person's cane

D- Give reason:

1- To communicate with each other in different seasons.

2- To communicate with each other ants if there is a danger nearby.

D- What happens if:

1- The nurse ants will send a smelly message to the scout ants to alert them.

2- It bounces back to the cane in the form of echo which is turned into vibrations.

Worksheet (9)

A- Choose:

1-b 2-a 3-b

4-b 5-b 6-a

7-b 8-c

B- Give reason:

1- Because moon doesn't emit its own light, but it reflects the sunlight falling on it.

2- Because fishing cat's eyes have a mirror like membrane that reflects any light falling on it.

C-Write the scientific term of each of the following:

1- Eyes 2-Fishing cat 3-Brain
4-Moon 5-Stars 6-Light
7- Eye 8-mirror like membrane 9-Nocturnal animal

D-Look at the following figures then answer:

a- Smooth surface because the rays will reflect at the same angle.

b- Rough surface because the rays will reflect in different directions.
c- Straight line.

B- Table (1)

1-d 2-c 3-b 4-a

C- Table (2)

1- b 2- d 3- a 4- a

Worksheet (10)

A- Choose the correct answer:

1- straight 2- mirrors 3- water 4- glass
5- The surface absorbs the light. 6- mirror

B- Complete from the following:

1- shadow 2- glass 3- water 4- scatters 5- smooth 6- tree

C- Write the scientific term:

1- Light reflection 2- Opaque materials
3- Smooth (shiny) surfaces 4- Shadow

D- Give reason for:

1- Because water allows most of light to pass through.
2- Because mirror is a smooth surface that reflects light rays in one direction.

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E- What happens when:

1- Paper scatters light rays in different (many) directions.

2- A shadow is formed.

Worksheet (11)

A- Complete from the following:

1- chemical

2- structural

3- sight

B- Write the scientific term:

1- Firefly

2- Human

C- Cross the odd word:

1- echolocation.

D- Give reason for:

1- To warn off a predator or to attract a mate.

E- What happens when:

1- They change their flash pattern to match that of the nearby fireflies group.

Worksheet (12)

A- Complete from the following:

1- Language

2- ears

3- codes

B- Choose from column (A) what suits it in column (B):

1- c

2- a

3- d

4- b

C- Give reason for:

1- Because they guide sailors.

D- What happens if:

1- The brain will send a response to your muscles to stop moving.

Worksheet (13)

(A) Write the scientific term of each of the following:

1-Pull. 2-Push. 3-Force. 4-Friction.

(B) Look at the opposite figure, then answer the following question:

B- 1- It will move faster.

B- 2- Car (A) because it travels a farther distance than car (B).

C-Put (√) or (x).

1- (x) 2 (√) 3 (√) 4(x)

D- Give reason:

1- Because the shockwave truck starts to stop gradually.

2-Because there is a friction force between the moving body and the ground that acts in the opposite direction of the body movement.

3- Due to the friction force between the ball and the ground that acts in the opposite direction of ball movement.

E- Complete the following sentences using the words below:

1- Unbalanced.
2- Friction.
3- Opposes
4- Balanced.

f-What happens if…..?

The truck, start moving and reach record speed.

Worksheet (14)

(A) Complete the following from the words between the brackets:

1- Kinetic 2- Energy

(B) Write the scientific term:

1- Force 2- work

(C) Correct the underlined words:

1- Work

2-Light

Worksheet (15)

A-Complete from the words between brackets :

1. kinetic

2. potential

3- kinetic

B- Write the scientific term of each of the following:

1-Kinetic energy. 2-Electrical energy.

3- Potential energy 4-Chemical potential energy.

C- Correct the underlined words:

1- Kinetic energy. 2- Thermal energy. 3- Potential energy.

D- Choose the correct answer:

1-d 2-c 3-d 4-b

E-what happens if……?

1-The stored energy in the train is changed into kinetic energy.

1- Its kinetic energy becomes zero.

Worksheet (16)

A-Table

1-d **2-c** **3-a**

B-Choose:

1-d **2-d** **3-c**

c- Complete from the words between brackets :

1-sound . **2-chemical energy .**

Worksheet (17)

Choose the correct answer:

1. (c) Energy
2. (c) bike
3. (b) Sound energy
4. (b) nylon
5. (c) Forward
6. (d) Changes – changes

Give reasons for:

1. They prevent passengers from moving forward when cars stop suddenly.
2. To let the driver get out of the car .
3. The bat transfers the kinetic energy to the ball .

Put (✓) or (x) :

1. (X)   2. (X)   3. (✓)   4. (X)   5. (X)

Complete the following sentences:

1. Airbag   2. Seatbelt – air bag   3. Change

Worksheet (18)

-Choose the correct answer:

1-d   2- d   3- d   4- c

-Complete the following sentences:

1-Distance - time.

- Problems:

1-Speed =Distance ÷ time

Speed=200÷4   Speed= 50 km/hr.

2- Speed =Distance ÷ time

Speed=3÷1   Speed=3km/hr.

3- Speed =Distance ÷ time

Speed=600÷6   Speed=100km/hr.

- Choose:

1. The passenger moves forward
2. Distance/ time
3. No another force stops it
4. Energy of the fast car is more and causes more damage.
5. Equals

- Write the scientific term:

1- Collision 2- Object's mass, speed or angle of inclination

3- Speed

Put (✓) or (x) in front each sentence:

1.(X) 2. (X) 3.(✓) 4.(X) 5.(✓)

Worksheet (19)

Choose the correct answer :

1. (d) A and C
2. (c) Severe injuries, due to the high speed
3. (d) All previous answers
4. (d) All previous answers
5. (d) B and C
6. (c) energy is destroyed
7. (c) Its mass and speed increase
8. (d) A boy rides a car and covers 400 meters in 1 minute.

Put (✓) or (x) :

1. (✓)   2. (✓)   3. (X)   4. (✓)   5. (✓)

Complete the following sentences using the given words:

1. *Doesn't disappear*
2. *Sound energy*
3. *Before – after*
4. *Mass*
5. *Large*
6. *Air*

Complete the following sentences using words between brackets :

1. *Less*
2. *Direct*
3. *Speed*
4. *Potential*

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محمد رزق
التعليمي

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